CANADA DEPARTMENT OF AGRICULTURE

ANNUAL REPORT

of the

FOREST INSECT AND DISEASE SURVEY

FOREST BIOLOGY DIVISION
SCIENCE SERVICE

1957

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FOREWORD

The year 1957 saw few changes in the general organization and operations of the Forest Insect and Disease Survey. The areas of responsibility and reporting arrangements remained the same as in 1956 and staff changes were few. Dr. D. K. Edwards filled a position with the Victoria Survey group that was vacated by Mr. G. S. Brown. Two new ranger positions were made available to the Calgary Laboratory and should allow field work to be intensified in northern Alberta and the forested areas of the Northwest Territories. Field accommodation was provided at Peace River, Alberta and a cabin was constructed at Prince George, B.C. Field coverage in British Columbia was improved and extended by the use of aircraft. An unusually wet season allowed the British Columbia Forest Service to provide more hours of flying for certain parts of the Interior than is usually possible and through the co-operation of various industries an intensive aerial coverage of Vancouver Island was carried out.

A group of senior officers of the Division convened in Ottawa early in 1957 to review the Forest Disease Survey. The value and necessity of conducting an extensive annual appraisal of disease conditions was reaffirmed along with the realization that much valuable taxonomic and ecological research could form an integral part of such a program. The main difficulties foreseen were obtaining satisfactory determinations of the many organisms and an adequate technical and supporting staff to keep up with material coming in from the existing field staff. A concerted effort is being made to overcome these difficulties.

Readers particularly interested in conditions in the Prairie Provinces will note the absence of a Disease Survey contribution for the Manitoba-Saskatchewan region. The officer responsible is engaged in post-graduate studies and it was found impossible to prepare a contribution. It is expected that a future report of the Saskatoon Laboratory will contain at least the highlights of the 1957 season.

The spruce budworm and the larch sawfly continued to be the principal forest insect problems in 1957. Essentially every region reported outbreaks of these pests. Similar reports on two other species, the large aspen tortrix and the forest tent caterpillar, were submitted by several regions. These and many other problems restricted to one or two regions are discussed in greater detail in the individual reports which follow.

Spruce budworm outbreaks and aerial spray programs to combat them again dominated the forest insect picture in Canada in 1957. The largest aerial spray program ever attempted in Canada was carried out with excellent results in northern New Brunswick and in the Gaspe Peninsula of Quebec. Forest conditions within the sprayed area vary considerably—from stands where a satisfactory complement of foliage has been retained to areas with scattered patches of dead trees. Forecasts for 1958 indicate heavy feeding only in restricted areas and reduced populations throughout much of the sprayed area. Further spraying may be necessary, however, if already weakened trees are to be prevented from dying. Severe defoliation occurred more widely in balsam fir stands south of the main outbreak in New Brunswick. In Nova Scotia, however, the populations declined markedly in most affected areas. The trend noted in 1956 for outbreaks in Newfoundland continued and all outbreaks have now virtually subsided. Rather high parasitism was recorded during 1957. The extensive spruce budworm outbreak in northwestern Ontario and adjacent Manitoba continued unabated with some further increase in size, particularly to the south and east into the Port Arthur District of Ontario. The extent of tree mortality in the

older portions of this outbreak also expanded. Elsewhere in Ontario, there was little change; north of Lake Superior the outbreak remained static and in northeastern Ontario the few small pockets of infestation declined further to a very low level. In Manitoba and Saskatchewan, spruce budworm larvae were found in more than usual numbers in several forest areas such as the Cypress Hills, Duck Mountains, and Spruce Woods Forest Reserve. Farther north the localized outbreak at Namew Lake continued. The extensive outbreak along the Mackenzie River system in the Northwest Territories was surveyed from the air and appeared to involve the same general areas as in the past few years. Ground checks indicated that there is every likelihood of the infestation continuing in 1958.

In British Columbia the one-year-cycle outbreak of spruce budworm in the Vancouver District declined further in intensity but increased slightly in area. Some top killing of Douglas fir trees has occurred but extensive tree mortality is most unlikely. Further declines were also noted in the two-year-cycle budworm infestation north of Prince George. However, the outbreak in the Babine Lake area was particularly severe. Extensive bud killing and wide-scale reddening of forests occurred as an unusual feature of this non-flight year.

Larch sawfly outbreaks were reported in all regions east of the Rocky Mountains. In Newfoundland, populations declined in the central and eastern regions; but light infestations in western Newfoundland showed indications of increasing. Although the occurrence of larch sawfly colonies in Nova Scotia in 1955 was not followed by any noticeable increase in abundance in 1956, colonies were found much more widely in 1957 and moderate defoliation occurred at several locations. General observations by officers of the Quebec Laboratory indicate that high populations existed over a considerable area in northwestern Quebec, an extension of similar conditions in Ontario. Little change was observed in the distribution or intensity of the larch sawfly in Ontario in 1957 and larch stands suffered varying amounts of damage throughtout the greater part of northern and central Ontario. A general decline was noted in most parts of Manitoba and Saskatchewan that have been affected previously; heavy infestations were found only north of the Churchill River in Saskatchewan. Larch trees over an extensive area in north-central Alberta again suffered moderate to heavy damage.

The characteristic rapid build-up of infestations of the large aspen tortrix was well demonstrated by conditions in several regions in 1957. Unusually large outbreaks were reported in north-central and northwestern Ontario. The small areas of defoliation in the aspen grove areas of Manitoba and Saskatchewan in 1956 were followed by general and severe damage over extensive areas in 1957. Similar conditions prevailed in adjacent parts of Alberta; in the Eastern Slopes region the large aspen tortrix was outnumbered by the Bruce spanworm. The large aspen tortrix was also reported to be numerous in some parts of the Prince George District in British Columbia.

There has been little to report on the forest tent caterpillar since the last serious outbreaks subsided in 1953. In 1957, a relatively small outbreak forecast for a remote part of northern Ontario failed to materialize, mainly because of a very low hatch of eggs. Future developments in this area will be followed closely. In Manitoba and Saskatchewan a small moderate to severe outbreak occurred in the Cypress Hills and larvae were collected in all forest districts. In Alberta, forest tent caterpillars were found in small numbers over much of the Province and egg counts indicate the possibility of complete defoliation in some areas in 1958. Although collected only in small numbers in British Columbia, numbers at two points increased noticeably.

The most significant development in the Forest Disease Survey in 1957 was the meeting of senior officers referred to above. No unusual disease conditions occurred during 1957 as was characteristic of the 1956 season. Severe frosts and spring droughts did cause more than the usual amount of winter burning of

conifers in eastern Canada as well as a loss of vigor in many hardwood species. The most significant finding in 1957 was the discovery of the Dutch elm disease at Woodstock, New Brunswick. It has been considered inevitable that this serious disease would spread into New Brunswick and this first recovery has made necessary the careful survey of elm trees in New Brunswick which is to take place in 1958. In British Columbia an intensive course given to Forest Biology rangers resulted in their submitting a great wealth of interesting material that added much to the local herbarium.

Contributions to scientific journals by the Survey officers during 1957 are listed below along with articles that appeared in the Bi-Monthly Progress Report of this Division. The latter have been added to provide a complete listing of published information prepared by Survey officers other than the numerous interim and annual reports circulated widely within each region. The listing also includes papers that have been accepted for publication and which are expected to appear during the early months of 1958.

Blais, J. R. and R. Martineau. Aerial spraying against spruce budworm in Quebec—1956. Bi-Monthly Progress Report 13 (3): 2-3, 1957.

Brown, C. E. Bruce spanworm, *Operophtera bruceata* (Hulst) in Alberta. Bi-Monthly Progress Report 13 (2): 3, 1957.

Condrashoff, S. F. A history of recent forest tent caterpillar infestations in the Interior of British Columbia. Proc. Ent. Soc. B.C., 54: 21-23, 1957.

Condrashoff, S. F. Aerial reconnaissance of beetle-killed ponderosa pine, Aspen Grove area. Bi-Monthly Progress Report 13 (1): 4, 1957.

Embree, D. G. The external morphology of the immature stages of the Beech Leaf Tier, *Psilocorsis faginella* (Cham.) (Lepidoptera: Oecophoridae), with notes on its biology in Nova Scotia. Can. Ent. In press.

Harvey, J. K. Improved technique for inflating and mounting insect larvae. Can. Ent. 89: 280-283, 1957.

Heron, R. J. and R. M. Prentice. Jack-pine budworm in pine plantations in the Spruce Woods Forest Reserve in 1956. Bi-Monthly Progress Report 13 (1): 2-3, 1957.

Lindquist, O. H. and A. A. Harnden. A new record of thrips on jack pine in Ontario. Bi-Monthly Progress Report 13 (2): 1, 1957.

McGugan, B. M. The Canadian Forest Insect Survey. Proc. X Int. Con. Ent. In press.

Raizenne, H. A. Forest sawflies of southern Ontario and their parasites. Pub. 1009 Can. Dept. Agric. 1957.

Ross, D. A. and D. Evans. Annotated list of forest insects of British Columbia. Part VI—*Plusia* spp. (Noctuidae). Part VII—*Apatela* spp. (Noctuidae). Proc. Ent. Soc. B.C. 54: 16-18, 1957.

Silver, G. T. Separation of the species of arborvitae leaf miners in New Brunswick. Can. Ent. 89: 97-107, 1957.

Silver, G. T. Studies on the arborvitae leaf miners in New Brunswick. Can. Ent. 89: 171-182, 1957.

Silver, G. T. The spruce budworm infestation in the Lillooet and Fraser River areas. Bi-Monthly Progress Report 13 (5): 3-4, 1957.

Sugden, B. A. A brief history of outbreaks of the Douglas fir tussock moth, *Hemerocampa pseudotsugata* McD. in British Columbia. Proc. Ent. Soc. B.C. 54: 37-39. 1957.

Wong, H. R. Sawflies of the genus *Platycampus* Schiodte on trembling aspen in the Canadian Prairies. Bi-Monthly Progress Report 13 (4): 2, 1957.

Readers are reminded that further information on any of the summary statements contained in this Report or copies of the above publications are available on request.

B. M. McGUGAN, *Co-ordinator*,
Forest Insect and Disease Survey.

ATLANTIC PROVINCES

FOREST INSECT SURVEY

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INTRODUCTION

Spruce budworm infestations in the Atlantic Provinces were extremely variable in 1957. In the areas that have been sprayed in New Brunswick, conditions ranged from generally good foliage production to small scattered patches of dead trees. Areas of moderate to severe attack increased in unsprayed stands south and southwest of the sprayed area. In Nova Scotia, budworm numbers were considerably reduced from 1956 in northwestern Cape Breton Island, but remained much the same in northern Victoria County. In Prince Edward Island severe attacks were largely confined to areas along the northern coast of Queens County. Infestations in Newfoundland have apparently subsided. The balsam gall midge was recorded in rather high numbers in central and southern New Brunswick, throughout Nova Scotia and in Prince Edward Island. In Nova Scotia infestations of the winter moth on red oak and white elm trees continued in many areas attacked previously; collections in Guysborough County represented a slight easterly extension in the area of known distribution. Plot studies in central New Brunswick showed that "stem attacks" of the balsam woolly aphid were considerably reduced as a result of low temperatures and inadequate snow cover in January. Balsam woolly aphid infestations were found over a wider area in Newfoundland in 1957 than in 1956. Small numbers of larch sawflies and traces of defoliation were found over a wider area in south-central Nova Scotia than in 1956; attacks of moderate intensity occurred in scattered areas of Grand Falls and St. George's districts in Newfoundland.

Records of forest insects new to the Survey in the Atlantic Provinces included a larch twig borer, *Argyresthia laricella* Kft., collections of which contained a new parasite species, and a leaf-mining sawfly, *Profenusa alumna* (McG.) on white birch and wire birch. Parasite emergence to date from material reared in 1957 has produced new recovery records in parts of New Brunswick for *Chrysocharis laricinellae* (Ratz.) and *Agathis pumilus* (Ratz.), parasites of the larch casebearer liberated periodically from 1943 to 1946. New parasite records for this region were also obtained for the fall cankerworm and the red-pine sawfly.

The assistance and co-operation extended by Forest Protection Ltd., by personnel of government and industry, and by collaborating individuals is gratefully acknowledged.

A total of 4,736 insect collections was received at the Fredericton, Debert and Corner Brook Laboratories, an increase of 600 over 1956. These were distributed as follows: New Brunswick, 1,594; Nova Scotia, 1,791; Prince

[1]Forest Biology Laboratory, Truro, Nova Scotia.
[2]Forest Biology Laboratory, Corner Brook, Newfoundland.

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Edward Island, 83; and Newfoundland, 1,268. Special reports on insect conditions totalled 409. The numbers of collections by major tree species are as follows:

Coniferous trees	Collections	Broad-leaved trees	Collections
Balsam fir	1,568	Birch	
Spruce—		White birch	180
White spruce	747	Wire birch	66
Black spruce	148	Yellow birch	20
Red spruce	113	Miscellaneous birches	14
Miscellaneous spruces	79		280
	1,087		
Tamarack	628	Poplar	
Pine—		Trembling aspen	91
Eastern white pine	99	Silver poplar	13
Jack pine	30	Lombardy poplar	13
Red pine	28	Largetooth aspen	11
Scots pine	7	Balsam poplar	11
Miscellaneous pines	9	Carolina poplar	5
	173	Miscellaneous poplars	21
			165
Eastern white cedar	18		
Eastern hemlock	13	White elm	127
Total	3,487	Maple—	
Miscellaneous hosts or host unspecified	498	Red maple	71
		Sugar maple	5
		Silver maple	5
		Miscellaneous maples	26
			107
		Oak—	
		Red oak	52
		Miscellaneous oaks	4
			56
		Beech	16
		Total	751
		Grand Total	4,736

MARITIME PROVINCES

IMPORTANT INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)—The accompanying map shows the degrees of infestation in the Maritime Provinces, based primarily on the loss of new foliage, and the areas in New Brunswick that have been sprayed between 1952 and 1957.

Conditions in the sprayed area ranged from generally good foliage production to patches of dead and dying trees. This variability has resulted largely from varying numbers of treatments in different areas and from different degrees of re-infestation. Studies by F. E. Webb indicated that most of the stands are capable of good growth recovery, but if the outbreak persists, further spraying will be necessary to prevent widespread tree mortality.

Outside of the sprayed area, aerial surveys and observations at some 1,100 locations on the ground showed that infestations increased in extent and severity at several points mainly in southwest Carleton County and in the south of York, Sunbury, and Queens counties. South of the main infestation more or less isolated areas of severe defoliation occurred at Lake View in Albert County and near Magaguadavic Lake in York County.

Serious deterioration of balsam fir south of the main Southwest Miramichi River has been confined largely to scattered areas near the Northumberland-Kent County line and north of Moncton in Westmorland County where a few dead trees were observed. However, some stands in York County near Fredericton and north of the St. John River are approaching a condition where further severe attack may weaken them beyond recovery, especially where balsam woolly aphid twig injury is prevalent.

Large moth flights were less common in northern New Brunswick than in previous years and no such flights were reported in the central and southern parts of the Province. Egg counts were relatively low in sprayed areas and defoliation in 1958 is expected to be no more than light. Egg-mass numbers were generally high and continued severe defoliation is expected in 1958 in Kent County and in some areas of York County, particularly in the Nashwaak, Nashwaaksis, and Keswick river valleys.

On the mainland of Nova Scotia, defoliation of white spruce trees varied from a trace to light in scattered areas in Cumberland, Colchester and Antigonish counties. On Cape Breton Island, the severity of infestations in northwestern Inverness County was considerably reduced from 1956 but numbers remained much the same in northern areas of Victoria County, and at Strathlorne. At Ingonish loss of new white spruce needles averaged about 60 per cent but some of the dominant trees lost about 90 per cent of their current foliage. Near North River about 70 per cent of the new foliage of balsam fir trees was destroyed. The infestation on white spruce near Strathlorne persisted and some of the mature trees lost as much as 80 per cent of their new needles; only a trace of defoliation was observed on younger trees. Some of the older trees, weakened by budworm and eastern spruce beetle attacks, died in 1957.

In Prince Edward Island, severe loss of the new needles of balsam fir occurred in stands within the National Park and on a few isolated trees in Kings County. Scattered outbreaks of moderate intensity occurred from Cavendish to Malpeque Bay and throughout much of Kings County. Elsewhere defoliation was light. Egg counts indicate that similar conditions can be expected in 1958.

	Reports	Collections	Larvae per tree sample	
			Av.	Dev. from 1956
New Brunswick	36	728	13.9	+2.3
Nova Scotia	15	178	10.4	−5.3
Prince Edward Island	5	56	4.0	+1.4

Balsam Gall Midge, possibly *Itonida balsamicola* (Lint.)—Small numbers of gall-infested needles were observed in the Maritime Provinces in 1955, but they were not found in large numbers until 1956. In 1957 most balsam fir stands in central and southern New Brunswick, Nova Scotia, and Prince Edward Island supported varying degrees of attack. Large numbers of galls on the new needles of balsam fir were found in New Brunswick at Gordonsville, Holmesville, Knoxford, Bellville, and Carlisle in Carleton County; at Burtts Corner, Springhill, Doak, Thomaston Corner, and Brockway in York County; at Pomeroy Bridge, Lawrence Station, Tower Hill Road, Canoose River Bridge, and near Oak Bay in Charlotte County. The most severe infestations in Nova Scotia were observed on Cape Breton Island where from 60 to 90 per cent of the new needles of young trees were infested at Lynch River, St. Peters, Grand River and Cleveland in Richmond County, and from Ben Eoin to Big Pond in Cape Breton County. The insect was common throughout Prince Edward Island but infestations were generally light.

The presence of the insect may be detected by one or more swellings or galls on the new needles, within which the larvae feed. The infested needles may become yellowish and usually drop off the tree in October and November. Trees of all sizes may be attacked. The insect is not particularly injurious but defoliation of the new shoots has a serious effect on the quality of Christmas trees. The biology of the insect and the practicability of control by chemicals are being studied.

	Reports	Collections
New Brunswick	34	15
Nova Scotia	7	37
Prince Edward Island	23	23

Winter Moth, *Operophtera brumata* (L.)—Collections of this insect from Sherbrooke and Melrose in Guysborough County, Nova Scotia, indicated a slight easterly extension of the known distribution of this introduced insect. Severe defoliation of apple, red oak, red maple, and white elm trees occurred along the coast from Halifax through Hubbards, Lunenburg, Bridgewater, from Port Mouton to Port Joli, and inland through much of Queens and Lunenburg counties. From Dartmouth to Waverley and Bedford, Halifax County, severe defoliation was observed wherever apple trees and red oak stands occurred. Most unsprayed apple orchards were almost completely defoliated from Grand Pre to Windsor and St. Croix. Infestations were light to moderate at several places in Colchester County.

European parasites, distributed in co-operation with the Insect Systematics and Biological Control Unit of the Entomology Division, included two shipments of *Phobocampe crassiuscula* (Grav.), one released at Head of St. Margaret's Bay, Halifax County, and one at Brooklyn, Queens County; one shipment of *Cyzenis albicans* (Fall.) released at Moose Lake, Lunenburg County; one shipment of *Agrypon flaveolatum* (Grav.) liberated at Wentzell Lake, Lunenburg County. Native parasites have been reared only occasionally. Studies of the practicability of using a disease to control this insect were continued.

	Reports	Collections
Nova Scotia	16	166

Fall Cankerworm, *Alsophila pometaria* (Harr.)—This insect was collected in all counties of New Brunswick except Restigouche and Gloucester, but only at Fredericton and Woodstock were numbers sufficiently high to cause noticeable defoliation of white elm trees. The spraying of shade trees by the city of Fredericton was continued with improved equipment.

In Nova Scotia, light infestations occurred on white elm at Lawrencetown, Paradise, and Bridgetown in Annapolis County, at Nappan and Oxford in Cumberland County, and at Belmont in Colchester County. Red oak trees were

light to moderately infested at Sims Settlement, Lunenburg County, and at Shelburne. At Wellington Station, Halifax County, where severe infestations have occurred in three consecutive years, fewer than 5 per cent of the eggs hatched and the outbreak subsided. Much of this mortality was the result of parasitism by *Euplectrus mellipes* Prov. and *Telenomus alsophilae* Vier.

The fall cankerworm and the winter moth were found together in a number of areas. Counts at sampling stations showed that the proportions of the former to the latter were as follows: Summerville, Queens County, 4:3; Tufts Cove, Halifax County, 1:1; Timberlea, Halifax County, 1:3; St. Margaret's Bay, Halifax County, 1:3; Kentville, Kings County, 1:3; Greenwich, Kings County, 2:3; and New Minas, Kings County, 4:1.

	Reports	Collections
New Brunswick	12	29
Nova Scotia	4	51
Prince Edward Island	4	—

Balsam Wooly Aphid, *Adelges piceae* (Ratz.)—R. E. Balch reported that the balsam wooly aphid was present throughout Grand Manan Island in New Brunswick. "Gouty" trees were found at North and South Head, at Dark Harbour, and at intermediate points. At Eel Brook Lake all balsam fir trees older than about 15 years of age were injured and there were many dead trees showing "gout". Trees with extremely rapid taper were common and apparently many had become infested over 20 years ago. At the present time the insect is not numerous on the Island.

Plot studies in central New Brunswick indicated that the intensity of "stem attack" was considerably reduced as a result of low temperatures and inadequate snow cover in January; during a two-day period, the minimum temperatures ranged from −20° to −48° F. "Stem attacks" were discovered near Thomaston Corner in York County and along the Cocagne River in Westmorland County.

In Nova Scotia, "gout" injury continued to cause a serious general deterioration of dominant balsam fir trees throughout the Province, particularly in coastal areas. Because of continued attack from "gout" and defoliators over several years on Cape Breton Island, about 70 per cent and 90 per cent, respectively, of the dominant trees on French and Mackenzie Mountains and about 80 per cent of such trees between Ingonish and North River are dead or dying. Balsam fir reproduction in these areas shows generally light to moderate "gout", but many of these trees are vigorous and have shown good foliage production despite severe budworm attack. The "gout" form of injury was severe throughout most of Prince Edward Island. "Stem attack" was found at Brundell River in Kings County.

A new European predator, *Aphidoletes thompsoni* Möhn, was released in New Brunswick in 1957. Preliminary studies have shown that at least a few have completed one generation.

	Reports	Collections
New Brunswick	10	—
Nova Scotia	18	1
Prince Edward Island	1	1

Eastern Hemlock Looper, *Lambdina fiscellaria fiscellaria* (Guen.)—This looper was common throughout the Maritime Provinces, but was collected only in small numbers.

	Reports	Collections	Larvae per tree sample	
			Av.	Dev. from 1956
New Brunswick	2	35	0.9	+0.1
Nova Scotia	6	68	1.0	+0.2
Prince Edward Island	—	1	0.5	—

Pine Leaf Chermes, *Pineus pinifoliae* (Fitch)—This insect attacks white pine shoots in the Maritime Provinces in odd-number years; severe damage to white pine trees occurred in 1947 and 1951 in central New Brunswick, but attacks were less severe in 1949, 1953, and 1955. In 1957 the insect caused only light injury to white pine shoots in central New Brunswick. Elsewhere in New Brunswick and in Lunenburg, Queens and Shelburne counties of Nova Scotia the insect occurred in small numbers and caused no perceptible damage.

	Reports	Collections
New Brunswick	12	28
Nova Scotia	2	7

Beech Scale, *Cryptococcus fagi* (Baer.)—The beech scale was found in small numbers on scattered beech trees near Eel Brook on the Island of Grand Manan, New Brunswick. This is the first record of the insect on the Island but cankers indicated that it was numerous about ten years ago.

Elsewhere in the Maritime Provinces light to moderate attack continued in much the same areas as in 1956.

	Reports	Collections
New Brunswick	3	2
Nova Scotia	6	—
Prince Edward Island	1	—

Larch Sawfly, *Pristiphora erichsonii* (Htg.)—Light infestations of this sawfly were more widespread in Nova Scotia than in 1956. Larval collections were taken and lightly defoliated tamarack stands were observed in areas through southern Halifax County, west along the coast to Chester, Lunenburg County, and northeast to Gegogan Brook, Guysborough County (see accompanying map). Also, one collection of larvae was received from Hardwoodlands in Hants County. Often no more than a trace of defoliation was observed, but about 25 per cent of the foliage on some trees was destroyed at Goff's Corner, Oyster Pond, Little Salmon River and Spry Bay in Halifax County. Two specimens were collected in New Brunswick near St. George. The insect was not found in Prince Edward Island.

	Reports	Collections
New Brunswick	2	1
Nova Scotia	4	232

Larch Casebearer, *Coleophora laricella* (Hbn.)—Except for a few scattered localities in Nova Scotia larch casebearer numbers have been very low in the Maritime Provinces since 1952. In 1957 light to moderate defoliation occurred at several points in New Brunswick including Folkins and Welsford in Queens County, at Linton and near the Acadia Forest Experiment Station in Sunbury County, and between Dorchester and Frosty Hollow in Westmorland County.

In Nova Scotia severe defoliation of tamarack trees occurred at Great Village and Kemptown, Colchester County; from Parrsboro to Middle River, Cumberland County; at Mount Thom, Pictou County; at Porter Lake and from Musquodoboit Harbour to Chezzetcook, Halifax County; near Glenwood, Yarmouth County; at Upper Grand Mira, Cape Breton County; along the North East Margaree to Lake O'Law Highway, Inverness County, and near Mahone Bay, Lunenburg County.

Rearing of several hundred larch casebearers from permanent sampling stations resulted in new recovery records for two introduced species of parasites liberated against this insect from 1943 to 1946: *Chrysocharis laricinellae* (Ratz.) was recovered for the first time in Nova Scotia at Hubley, Halifax County, and in Gloucester County, New Brunswick; *Agathis pumilus* (Ratz.) was taken in Sunbury and Queens Counties of New Brunswick.

In 1957, techniques leading to adoption of a sequential sampling method for overwintering larvae were tested. This method, described by Webb (Bi-Monthly Progress Report 13 (4): 1-2, 1957) is based on numbers of larvae per 100 needle fascicles on one or more apical shoots from the lower crown of up to ten trees. A sequential table was used to classify numbers of casebearers per 100 fascicles in three degrees of potential infestation as follows: Light, 5 or less; moderate, 10 to 20; severe, 40 or more.

Counts of overwintering casebearers at sampling stations in New Brunswick and Nova Scotia showed that the infestation classes by districts were as follows:

District	No. sampling stations	Av. No. cases per sample	Infestation class
Southern New Brunswick	14	7.5	Light
Northeastern New Brunswick	12	4.4	Light
Northwestern New Brunswick	13	1.9	Light
Eastern Nova Scotia	16	7.3	Light
Western Nova Scotia	16	10.6	Moderate

	Reports	Collections
New Brunswick	10	79
Nova Scotia	7	96

European Spruce Sawfly, *Diprion hercyniae* (Htg.)—The population has been low throughout the Maritime Provinces for the past several years. Despite this, the incidence of the polyhedral virus disease has increased considerably. Two plots near Fredericton showed the following percentages of diseased larvae respectively: 8.2 and 17.5 in 1957 compared with 0.3 and 4.5 in 1956.

	Reports	Collections	Larvae per tree sample	
			Av.	Dev. from 1956
New Brunswick	6	70	1.6	+0.1
Nova Scotia	10	143	1.1	−0.2
Prince Edward Island	1	7	0.6	—

Yellow-headed Spruce Sawfly, *Pikonema alaskensis* (Roh.)—Small numbers of this insect were observed at Scotch Lake, York County, New Brunswick, where moderate to severe defoliation of white spruce reproduction occurred from 1953 to 1955 inclusive. In Truro, Nova Scotia, the insect destroyed about 70 per cent of the foliage of a red spruce hedge. Elsewhere in the Maritime Provinces populations were small.

	Reports	Collections
New Brunswick	4	18
Nova Scotia	10	31

Black-headed Budworm, *Acleris variana* (Fern.)—This insect was collected only in small numbers throughout the Maritime Provinces but was more common in New Brunswick in 1957 than in 1956, particularly in the northwestern counties. A collection at Connors, Madawaska County, contained an average of nine specimens per tree sample.

	Reports	Collections	Larvae per tree sample	
			Av.	Dev. from 1956
New Brunswick	5	114	1.4	+0.7
Nova Scotia	8	19	0.6	+0.2
Prince Edward Island	—	6	1.3	—

European Pine Shoot Moth, *Rhyacionia buoliana* (Schiff.)—This introduced species was found only at Fredericton in New Brunswick where it attacked a few mugho pines. In Nova Scotia it was common on ornamental pines in the Annapolis Valley. Mugho pines at Paradise supported light infestations and nursery plantings were attacked near Great Village, Colchester County. The insect was not collected in Prince Edward Island.

	Reports	Collections
New Brunswick	—	1
Nova Scotia	3	2

Satin Moth, *Stilpnotia salicis* (L.)—The infestation at Campbellton, New Brunswick, where Carolina and silver poplar trees were attacked in 1955 and 1956, has subsided. Small collections were taken from silver poplar trees at several points on Cape Breton Island but little defoliation was observed. In Prince Edward Island defoliation of Carolina and silver poplars ranged from 50 to 100 per cent at Mill Cove and Rustico in Queens County, at St. Peters in Kings County, and at Portage in Prince County.

	Reports	Collections
New Brunswick	4	5
Nova Scotia	1	8
Prince Edward Island	3	4

White-marked Tussock Moth, *Hemerocampa leucostigma* (J. E. Smith)—This insect was collected in small numbers in all the eastern counties of New Brunswick, but little or no defoliation was observed.

The severe infestations reported in 1956 in Nova Scotia were greatly reduced and little damage was noticeable in 1957. The reduction in population was mainly attributed to the prevalence of a polyhedral virus, but parasites were also effective. Severe but local outbreaks occurred on red maple, beech, balsam fir, and tamarack at Tangier, Halifax County, and near Westchester Mountain, Cumberland County (see accompanying map). The infestation in northern Yarmouth and southern Digby counties, where light and moderate attacks occurred in 1956, increased in area and intensity.

	Reports	Collections
New Brunswick	6	14
Nova Scotia	7	41

Birch Leaf Miner, *Fenusa pusilla* (Lep.) and ***Birch Leaf-mining Sawfly,*** *Heterarthrus nemoratus* (Fall.)—Almost all white birch and wire birch stands in central and southern New Brunswick were attacked to some extent by the birch leaf miner. The most severe infestations were observed in areas along the Southwest Miramichi River between Boiestown and Newcastle, in the Nashwaak River Valley, in areas adjacent to Grand Lake, and in stands in Westmorland and Albert counties near Moncton.

In Nova Scotia both species were present throughout the Province and often in association, but the birch leaf miner was more common. Severe browning of white birch and wire birch leaves occurred at Lansdowne, Digby County; at Oak Hill, Lunenburg County; at Middlefield, Queens County, in the Wentworth Valley and in the New Glasgow, Stellarton and Westville areas.

The birch leaf miner was common in Prince Edward Island but affected no more than 20 per cent of the leaves.

	Reports	Collections
New Brunswick	15	26
Nova Scotia	4	46
Prince Edward Island	2	2

Birch Casebearer, *Coleophora fuscedinella* (Zell.)—Varying degrees of attack on the foliage of white birch, wire birch, and yellow birch by the birch casebearer were observed in New Brunswick south of a line between Grand Falls and Shippegan Island. Moderate to severe loss of foliage occurred near Bathurst, at Lamèque on Shippegan Island, between Boiestown and Newcastle, and in areas between Stanley and Fredericton along the Nashwaak River. Elsewhere defoliation was generally light.

The casebearer was common in Nova Scotia on birch, alder and apple. On the mainland severe infestations occurred at Shulie River and from Parrsboro to four miles east of Frazerville, Cumberland County. On Cape Breton Island about 70 per cent of the foliage on white birch reproduction was destroyed near Ingonish, Wreck Cove and Big Bras d'Or, Victoria County; and at Little Bras d'Or, Cape Breton County.

The insect was found in small numbers on white birch and wire birch in Prince Edward Island.

	Reports	Collections
New Brunswick	18	55
Nova Scotia	4	46
Prince Edward Island	—	4

Basswood Looper, *Erannis tiliaria* (Harr.)—The local outbreak which caused noticeable defoliation of a number of hardwood hosts near Campbellton in 1955 and in 1956, subsided in 1957. In other parts of the Maritime Provinces numbers were low.

	Reports	Collections
New Brunswick	1	2
Nova Scotia	—	9
Prince Edward Island	1	3

Fall Webworm, *Hyphantria cunea* (Drury)—The fall webworm, which increased in abundance throughout the Maritime Provinces in 1956, continued to increase in 1957; there will probably be a further increase in 1958. The increase was two- to threefold over 1956 in many parts of New Brunswick and Nova Scotia, based on nest tallies along the same roads. In New Brunswick the infestation was severe only in the southeast, between Moncton and the Nova Scotia border. In Nova Scotia the infestation was generally severe, especially along the south coast where 150 or more nests per mile were common.

The degree of parasitism also increased. *Apanteles hyphantriae* Riley was quite prevalent in New Brunswick and *Mericia ampelus* (Wlk.), which was considered the most important parasite in earlier outbreaks, was more common throughout New Brunswick and Nova Scotia in 1957 than in 1956. However, overall parasitism was still relatively low.

	Reports	Collections
New Brunswick	1	45
Nova Scotia	5	78

Red-pine Sawfly, *Neodiprion nanulus nanulus* Schedl—The infestation on red pine trees at the Acadia Forest Experiment Station near Fredericton continued to cause noticeable defoliation, but numbers were lower than in 1956. Rearing of 4,870 larvae collected in this area produced a total of 61 specimens of the ichneumonid parasite, *Lamachus lophyri* (Ashm.), a species not previously reared from this host in the Maritime Provinces.

Studies by D. E. Elgee showed that at least 75 per cent of the larvae died on trees sprayed with virus suspension.

	Reports	Collections
New Brunswick	1	10

Green-striped Mapleworm, *Anisota rubicunda* (Fabr.)—The outbreak of this insect, which caused light to moderate defoliation of maple trees near Carroll's Crossing, Northumberland County, New Brunswick in 1956, has terminated. No infestations were reported in other parts of the Maritime Provinces.

	Collections
New Brunswick	1

A Larch Twig Borer, *Argyresthia laricella* (Kft.)—Small numbers of this borer were collected at 25 localities in 11 counties of New Brunswick. These are the first collections by the Survey, but its wide distribution suggests that it has been present in New Brunswick for some time. Parasites reared were as follows: *Spilochalcis albifrons* (Walsh), *Habrocytus* sp., and *Phaeogenes* n. sp.

The insect was not found in Nova Scotia or in Prince Edward Island.

	Reports	Collections
New Brunswick	4	25

Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch)—Webbed nests formed by this insect were numerous on choke cherry and black cherry bushes and trees in central and southern New Brunswick and throughout much of Nova Scotia. The insect was present in small numbers in Prince Edward Island.

	Reports	Collections
New Brunswick	3	22
Nova Scotia	3	18
Prince Edward Island	1	2

NEWFOUNDLAND

Spruce Budworm, *Choristoneura fumiferana* (Clem.)—Only 337 budworms were received at the Corner Brook Laboratory compared with 4,261 in 1956. These were collected in the districts of St. George's and Humber.

High mortality of larvae and pupae, caused mainly by parasitism in 1956, accounted for this striking reduction. In the Hawkes Bay area, where about 80 per cent of the new needles of balsam fir was destroyed in 1956, no defoliation was observed in 1957 and collections averaged less than one larva per tree sample. Egg-mass sampling in 1957 was restricted to only a few points in St. George's and St. Barbe districts because of the small populations. Predictions for 1958 are that populations will remain small.

Reports	Collections	Larvae per tree sample	
		Av.	Dev. from 1956
2	59	2.1	−2.9

Balsam Woolly Aphid, *Adelges piceae* (Ratz.)—A new severe outbreak was noted throughout the Lower Serpentine River Valley where estimated mortality of balsam fir trees reached 50 per cent. Along the north shore of Deer Lake near Goodyear's Brook two small infestations of one to three acres were located. At Steady Brook several balsam fir trees showing the "gout" form of injury were reported a few miles west of the boundary recorded in 1956. "Gout' has always been more common than "stem attack" and has caused a serious general deterioration of balsam fir in southwestern Newfoundland and in the Burin and Avalon peninsulas for approximately 20 years. Except for the Serpentine Valley and Deer Lake areas, "stem attack" was less severe than in 1955 and 1956, and was generally classified as light to moderate in the Wild Cove, Frenchman's Cove, and Fishells areas. In several areas where severe "stem attack" was reported previously, salvage cutting has removed most of the

affected trees, and in others, "stem infestation" died out when the trees were killed. Intensive air and ground surveys failed to show any balsam woolly aphid attack in the interior of the Province. The infestations in the Southwest River and little Barachois Brook Valleys extended about 2 miles beyond the boundaries reported in 1956. Along the Bottom Brook Valley the infestation was found within 10 miles of the mouth of Little Grand Lake Brook.

Totals of 464 and 16 specimens, respectively, of the European predators, *Pullus impexus* (Muls.) and *Aphidecta obliterata* L., were released in 1957 near John's Beach on the south side of Humber Arm.

Reports	Collections
9	1

Eastern Hemlock Looper, *Lambdina fiscellaria fiscellaria* (Guen.) Numbers of this species remained low. Most of the larvae collected this year originated in the Bishop's Falls region but no defoliation of balsam fir was observed.

Reports	Collections	Larvae per tree sample	
		Av.	Dev. from 1956
2	23	1.0	+0.2

Balsam-fir Sawfly, *Neodiprion abietis* (Harr.)—A light to moderate outbreak continued in the Gallants and George's Lake areas. Numbers were generally lower than in 1956 and current defoliation was less than 25 per cent. A few balsam fir trees have died from attack by this species usually on wet, unfavourable sites. Preliminary studies on the biology and ecology of this species were initiated in 1957.

Reports	Collections
2	108

Spruce Bud Moth, *Zeiraphera ratzeburgiana* (Ratz.)—Populations of this species declined in 1957. Some defoliation, ranging from a trace to 10 per cent of the new foliage, was observed on white spruce trees in the Highlands areas of St. George's District.

Reports	Collections
1	23

European Spruce Sawfly, *Diprion hercyniae* (Htg.)—No change was observed in the status of this species. Collections were received from all sections of the Province, except the Avalon Peninsula and the south coast. The highest populations were recorded on white spruce trees in central Newfoundland in the Badger and Bishop's Falls regions.

Reports	Collections	Larvae per tree sample	
		Av.	Dev. from 1956
1	54	1.1	−0.5

Yellow-headed Spruce Sawfly, *Pikonema alaskensis* (Roh.)—Defoliation of young black spruce trees was reported at Pinsent's Ridge, Terra Nova. The damaged trees were about 5 feet high. This is the same locality where an infestation occurred in 1954.

Reports	Collections	Larvae per tree sample	
		Av.	Dev. from 1956
1	52	1.7	—

Black-headed Budworm, *Acleris variana* (Fern.)—Populations of this insect remained low in Newfoundland, although numbers were higher in 1957 than they have been since 1952. From 1949 to 1952 severe outbreaks occurred in parts of central, eastern, and northern Newfoundland. Most of the 1957 collections came from the St. George's District.

Collections	Larvae per tree sample	
	Av.	Dev. from 1956
9	1.2	+0.8

Larch Sawfly, *Pristiphora erichsonii* (Htg.)—Larch sawfly numbers were generally low in most sections of central and eastern Newfoundland and defoliation was less than 20 per cent. However, moderate defoliation of tamarack trees occurred in areas on the Buchans Road, southwest of Badger (see accompanying map). In western Newfoundland light infestations were recorded near Pasadena and Corner Brook and in parts of Grand Lake where foliage loss was about 10 per cent. Near Flat Bay Brook defoliation reached about 30 per cent. Outbreaks in central Newfoundland appear to be terminating, but in the western regions populations are increasing.

Reports	Collections	Larvae per tree sample	
		Av.	Dev. from 1956
4	51	8.3	2.6

Larch Casebearer, *Coleophora laricella* (Hbn.)—Twig sampling showed that smaller numbers prevailed throughout most of the Province. The only defoliation observed was in the Highlands area near St. Fintan's where light browning of larch foliage was noticeable. This species has not been found in numbers since 1951. Several species of parasites, as yet undetermined, were reared in 1957.

Reports	Collections
1	24

European Pine Shoot Moth, *Rhyacionia buoliana* (Schiff.)—This species caused damage to ornamental red pines in the St. John's area.

Reports	Collections
1	1

Satin Moth, *Stilpnotia salicis* (L.)—Populations remained high on ornamental Lombardy poplars in the Town of Deer Lake. Numbers were generally low in central Newfoundland and no defoliation of trembling aspen occurred as reported in 1956 from the Gambo and Bishop's Falls areas where sample plots were established in natural aspen stands.

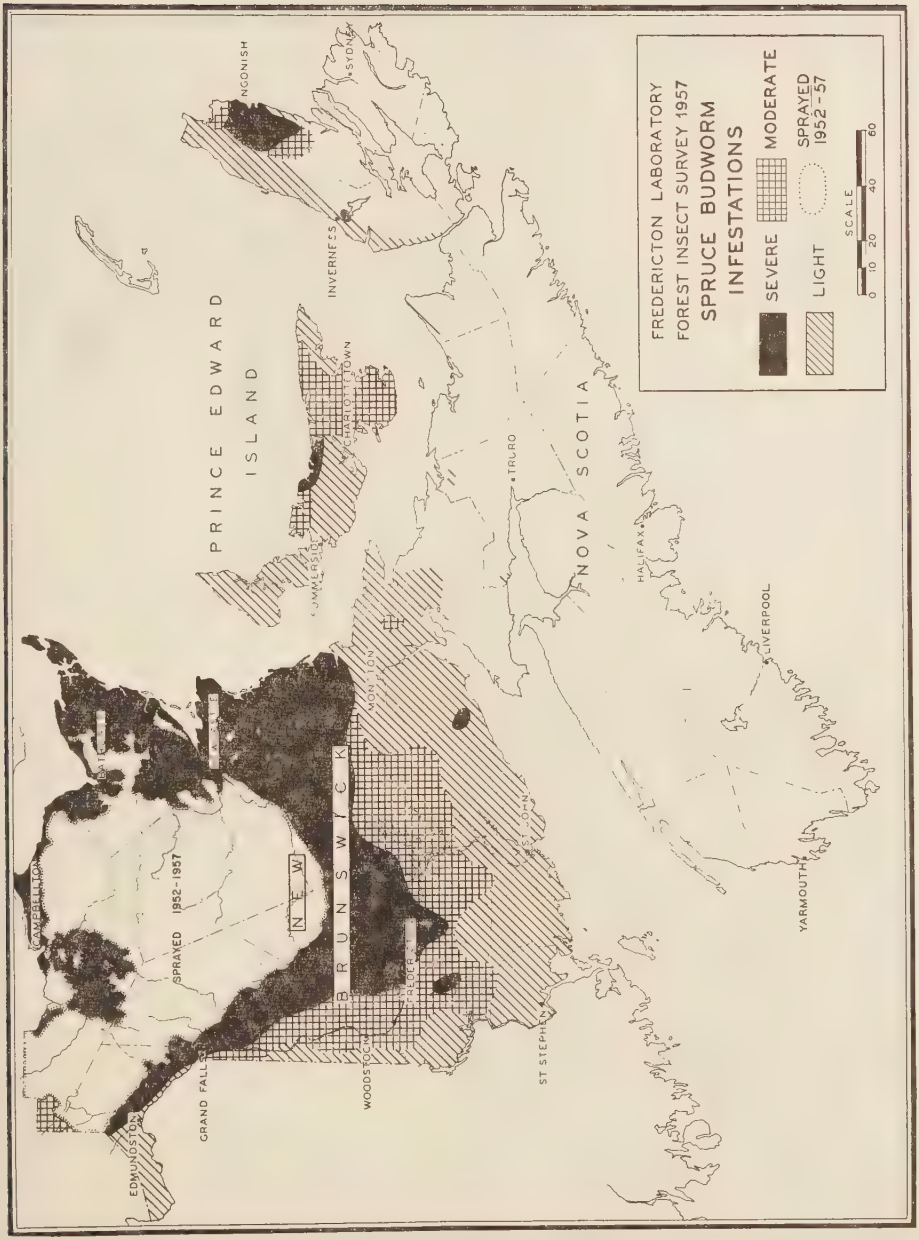
Reports	Collections
3	14

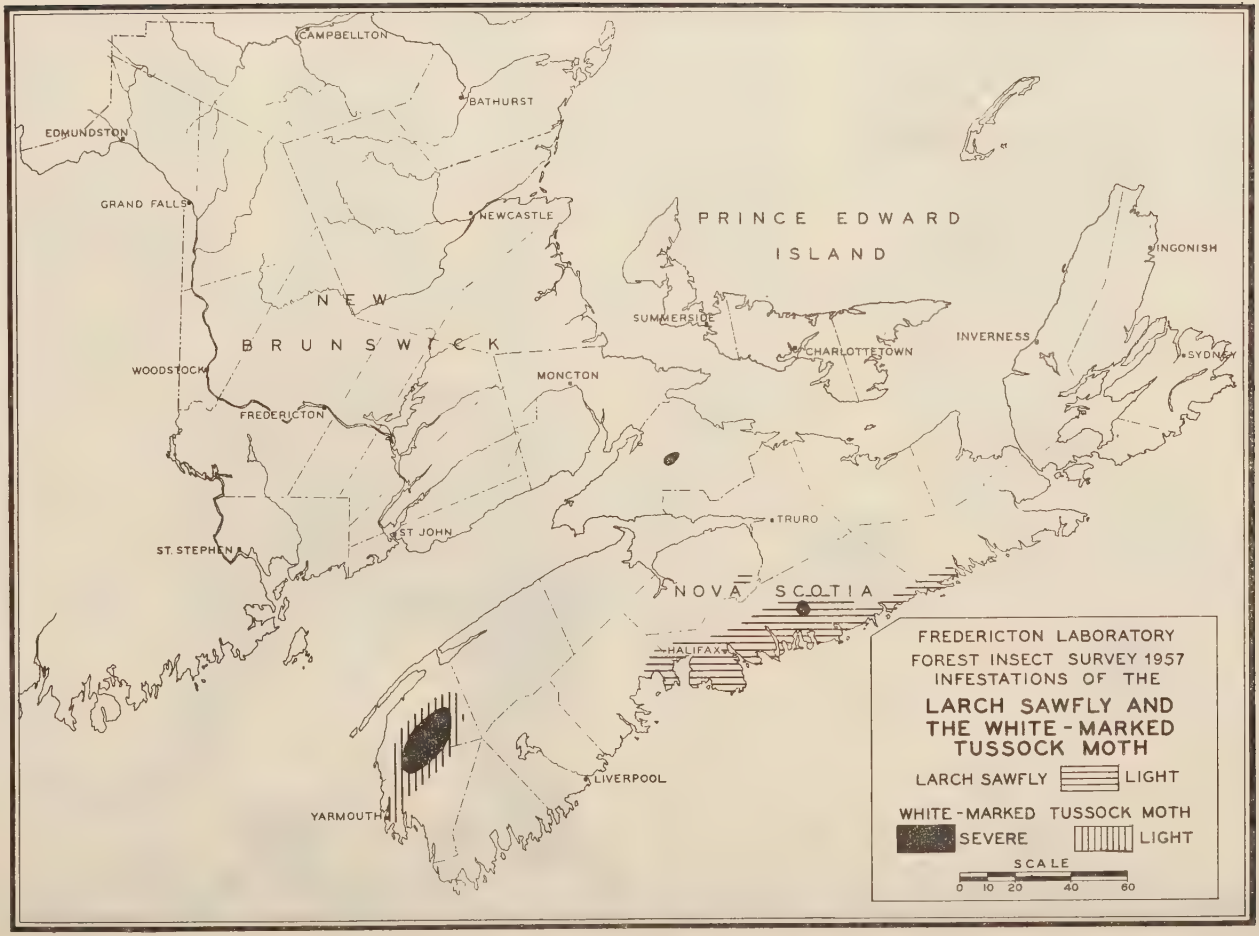
Bruce Spanworm, *Operophtera bruceata* (Hulst)—Only a few larvae were collected at Appleton this year. No defoliation was recorded and the infestation that has persisted since 1954 has apparently terminated.

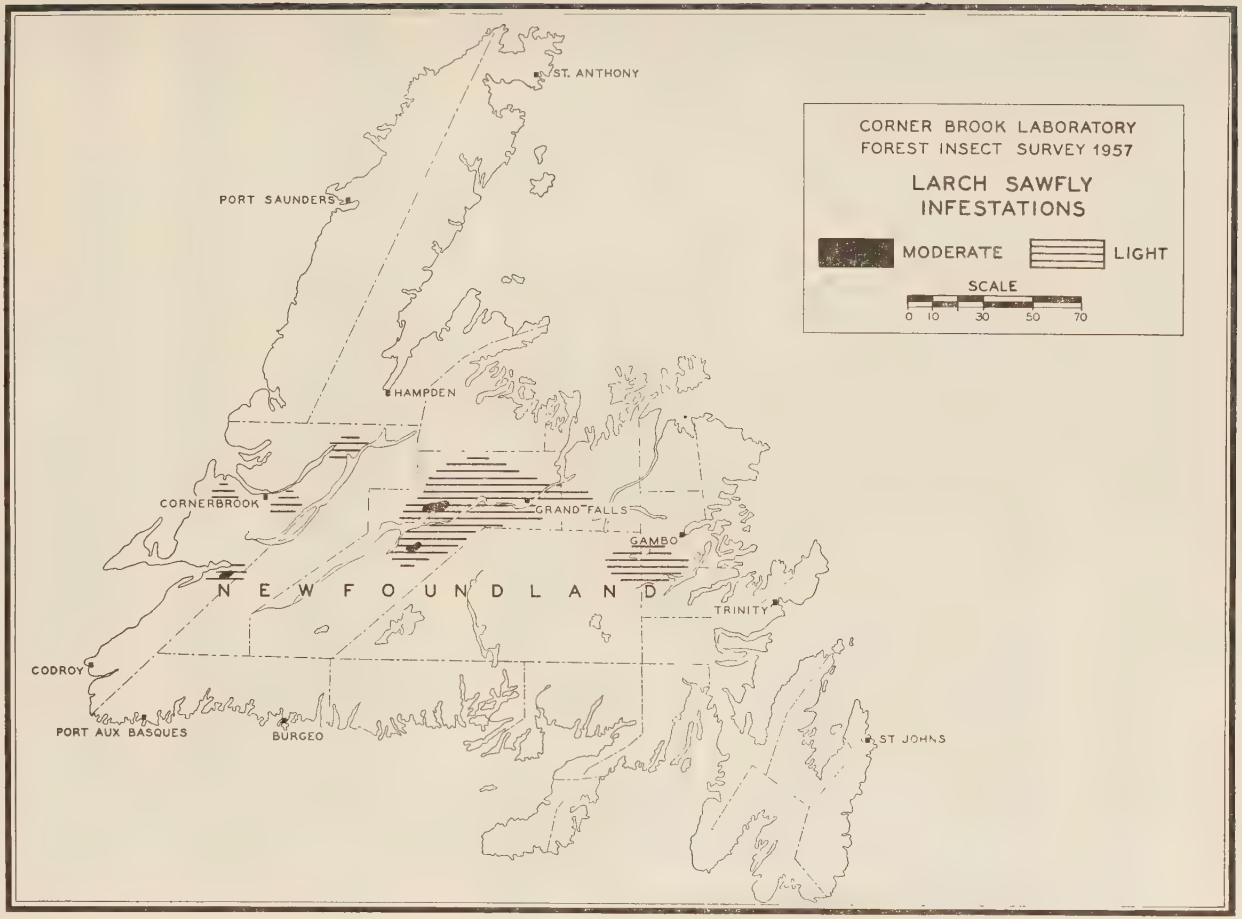
Reports	Collections
2	3

Mountain-ash Sawfly, *Pristiphora geniculata* (Htg.)—Numbers were generally low in 1957. However, complete defoliation of mountain ash trees was observed in a few cases in western Newfoundland.

Collections
3


FREDERICTON LABORATORY
FOREST INSECT SURVEY 1957
SPRUCE BUDWORM
INFESTATIONS
SEVERE
MODERATE
LIGHT
SPRAYED 1952-57
SCALE
0 10 20 40 60
SPRAYED 1952-1957
NEW BRUNSWICK
PRINCE EDWARD ISLAND
NOVA SCOTIA
CAMPBELLTON
EDMUNDSTON
GRAND FALLS
WOODSTOCK
MONCTON
ST JOHN
ST STEPHEN
CHARLOTTETOWN
SUMMERSIDE
NORTH SYDNEY
NGONISH
INVERNESS
TRURO
HALIFAX
LIVERPOOL
YARMOUTH


CAMPBELLTON
BATHURST
EDMUNDSTON
GRAND FALLS
NEWCASTLE
PRINCE EDWARD ISLAND
INGONISH
NEW BRUNSWICK
SUMMERSIDE
CHARLOTTETOWN
INVERNESS
SYDNEY
WOODSTOCK
MONCTON
FREDERICTON
TRURO
ST. STEPHEN
ST JOHN
NOVA SCOTIA
HALIFAX
LIVERPOOL
YARMOUTH
FREDERICTON LABORATORY
FOREST INSECT SURVEY 1957
INFESTATIONS OF THE
LARCH SAWFLY AND THE WHITE-MARKED TUSSOCK MOTH
LARCH SAWFLY LIGHT
WHITE-MARKED TUSSOCK MOTH
SEVERE LIGHT
SCALE
0 10 20 40 60


CORNER BROOK LABORATORY
FOREST INSECT SURVEY 1957
LARCH SAWFLY
INFESTATIONS
MODERATE
LIGHT
SCALE
0 10 30 50 70
ST. ANTHONY
PORT SAUNDERS
HAMPDEN
CORNERBROOK
GRAND FALLS
GAMBO
NEWFOUNDLAND
TRINITY
CODROY
PORT AUX BASQUES
BURGEO
ST JOHNS

ATLANTIC PROVINCES

FOREST DISEASE SURVEY

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INTRODUCTION

During 1957, weather conditions in the Atlantic Provinces were generally less favourable to the development of forest tree diseases than during the previous year. No unusual weather conditions occurred to cause severe non-parasitic diseases as in 1956. The dry spring and early summer proved to be unfavourable for the optimum development of foliage diseases. The status of only the more important foliage diseases is reported below.

The most significant event during the year was the discovery of an elm infected with *Ceratocystis ulmi* (Buism.) C. Moreau, the cause of Dutch elm disease, at Woodstock, N. B. To date, only a limited amount of scouting for this disease has been carried out in the Maritime Provinces. The discovery of the disease in New Brunswick will make necessary a more intensive survey during 1958, particularly in the Woodstock area.

In an attempt to reduce the amount of handling of diseased material in the laboratory, forest pathologists attached to the Survey submitted only reports for easily diagnosed diseases. The 374 collections handled were, therefore, diseases difficult or impossible to diagnose in the field, unknown diseases, or diseases which co-operators collected. Further curtailment is planned for 1958; Forest Biology rangers will submit reports, rather than collections, of important disease conditions with which they are familiar.

Members of the Mycology Unit, Botany and Plant Pathology Division, Ottawa, again assisted with the identification of fungi and Dr. René Pomerleau, Forest Biology Laboratory, Quebec, cultured for us material suspected of Dutch elm disease.

IMPORTANT DISEASES

Ink Spot of Aspen—Ink spot of aspen caused by *Ciborinia whetzelii* (Seav.) Seav. was observed at points in New Brunswick, Nova Scotia, and Newfoundland. Although this disease was responsible for severe damage to aspen in northern New Brunswick during 1956, severe damage was observed only in small local areas in New Brunswick during 1957.

Willow Blight—Damage caused by willow blight *Fusicladium saliciperdum* (All. and Tub.) Lind. and *Physalospora miyabeana* Fuk. throughout the Maritime Provinces was generally much less than in the three previous years.

Ash Rust—Attack by the ash rust fungus *Puccinia sparganioides* Ell. & Barth. was again light in the Maritime Provinces. The heaviest infections were observed along the south shore of Queens Co., N.S. The rust was found along the Saint John River, N.B., as far north as Florenceville.

Cherry Blight—The blight of pin cherry reported in the Maritime Provinces during recent years was observed infrequently in 1957.

Beech Bark Disease—During 1957, beech trees were examined in northern New Brunswick to determine the northern limits of *Nectria coccinea* var. *faginata* Lohm., Wats. and Ayers in relation to the limits for the beech scale, *Cryptococcus fagi* (Baer.), given in the 1955 Report. Although cankers were found on beech trees in all parts of northern New Brunswick, they were caused by *Nectria galligena* Bres. As far as is known at present, *Nectria coccinea* var. *faginata* does not occur beyond the known limits of the beech scale.

Dothichiza Canker of Poplar—Lombardy poplars at Fredericton and Minto, N.B. were infected by *Dothichiza populea* Sacc. & Br. This disease has not been recorded in the Atlantic Provinces in recent years; the infected trees were imported recently from Ontario nurseries.

Miscellaneous Diseases—Dying of large branches on mature and second growth red spruce trees was reported to be widespread in Yarmouth and Digby Counties, N.S. Red flags on mature sugar maples, especially those growing along roads, were conspicuous in the Parrsboro, Annapolis Valley, and Antigonish areas of Nova Scotia. The causes of these diseases are not known and will be investigated during 1958.

Species of *Cytospora* were commonly found associated with dieback and cankers of many hardwood species. The most noticeable damage was observed on trembling aspen in some parts of Nova Scotia and Prince Edward Island where brown flags were common on infected trees. These flags were apparently caused by either *Cytospora chrysosperma* Fr. or *Cytospora nivea* Sacc.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Maple, red	*Pezicula carnea* (Cke. & Ell.) Rehm	Ripples, N.B.	Associated with cankers on living trees. First herbarium record.
	Sphaeronema acerinum Pk.	Ripples, N.B.	Associated with cankers and dieback of living tree. Imperfect state of *Dermea acerina* (Pk.) Rehm. First herbarium record.
Oak, red	*Actinopelte dryina* (Sacc.) Hoehn.	St. Stephen, N.B.	Causes a leaf spot. First record for district.
	Diaporthe leiphaemia (Fr.) Sacc.	Park, N.B.	Occurred on dead branches of a living tree. First record for district.
Spruce, white	*Cytospora kunzei* Sacc.	Fredericton, N.B.	Causes branch cankers. New host record for district.
Willow	*Melampsora paradoxa* Diet. & Holw.	Londonderry Mines, Lily Lake, N.S.	A leaf rust. First herbarium records.
	Valsa salicina Fr.	Fredericton, N.B.	Associated with cankers and dieback. First herbarium record.

PROVINCE OF QUEBEC

FOREST INSECT SURVEY

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INTRODUCTION

The Forest Insect Survey in Quebec followed the same procedures that have been in effect in recent years; it restricted its activities to specific problems in particular areas. Aerial and ground surveys were made of the spruce budworm infestation in the Gaspe region and investigations of jack-pine sawflies were continued and extended to include the Manicouagan and Lower St. Lawrence regions. Information on the distribution and abundance of the European spruce sawfly, European pine shoot moth, larch sawfly, and eastern hemlock looper was obtained during special studies of these forest insects.

IMPORTANT INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)—The spruce budworm remained the most serious insect problem in the forests of Quebec in 1957. Although the insect is present in coniferous stands over the entire Province, it is currently abundant only in the Lower St. Lawrence and Gaspe regions. The insect has been active in these regions since 1948 with severe defoliation occurring over large areas and tree mortality in some localities. In 1957 approximately 1.2 million acres of severely infested balsam fir were sprayed from the air with satisfactory results.

On the basis of aerial and ground surveys the Lower St. Lawrence and Gaspe regions could be divided into two zones based on budworm abundance. The first, where numbers are small, included Matane and Gaspe Nord counties. In Matane the population has decreased considerably in the last two years; in Gaspe Nord it had never reached a high level except in small areas. The second zone consisted of the remaining part of the two regions in which, although variations occurred, the initial population in 1957 generally exceeded that of 1956. This was evident from both population counts and defoliation records. In addition to the normal decline, the population was sharply reduced near the end of the larval period from the action of a disease which was favoured by the unusually wet season.

As in previous years, an egg survey was conducted in late August and early September; samples were taken in 619 localities. This survey indicated that pupae and egg-masses generally were less abundant than in 1956. Only 30 per cent of the localities were classified as severe compared with 61 per cent in 1956. Most of these localities were in the southeastern section of Bonaventure County, and throughout Gaspe Sud County where spraying is contemplated for 1958.

Swaine Jack-pine Sawfly, *Neodiprion swainei* Midd.—In 1957, the survey for this sawfly was extended to include the western section of the Manicouagan and the Lower St. Lawrence regions. Only old cocoons originating from previous infestations were found in the first area but recent evidence of these sawflies was seen at St. Fabien, Rimouski, and about 14 miles south of Riviere du Loup.

Sampling within the area surveyed in previous years, revealed a general decrease in population west of the St. Maurice River, although some centers of infestation are still active. Moderate infestations were located in the upper section of the Barriere Road and in the Pine Lake area on the Lievre River. On the St. Maurice River, the heavy infestation recorded at Alice Lake in 1956, was classified as moderate in 1957; a virus disease caused significant larval mortality.

In the Lake St. John and Saguenay regions populations were not affected by the early fall frosts of 1956, and they remained high in 1957.

Red-headed Jack-pine Sawfly, *Neodiprion virginianus* complex—Sawfly collections from jack pine trees in previous years revealed small numbers of this species along with *N. swainei.* In 1957, a light to moderate infestation was found at St. Hilarion in Charlevoix County and larvae were collected commonly in Settrington Township and in the du Gouffre watershed.

Black-headed Jack-pine Sawfly, *Neodiprion pratti banksianae* Roh.—Small pockets of infestation of this sawfly have been recorded for the past two years at the Ottawa Rapids on the Barriere Road and on the Notawissi River, a tributary of the Gatineau. Observations made in the same stands at the end of this season failed to show any trace of current defoliation.

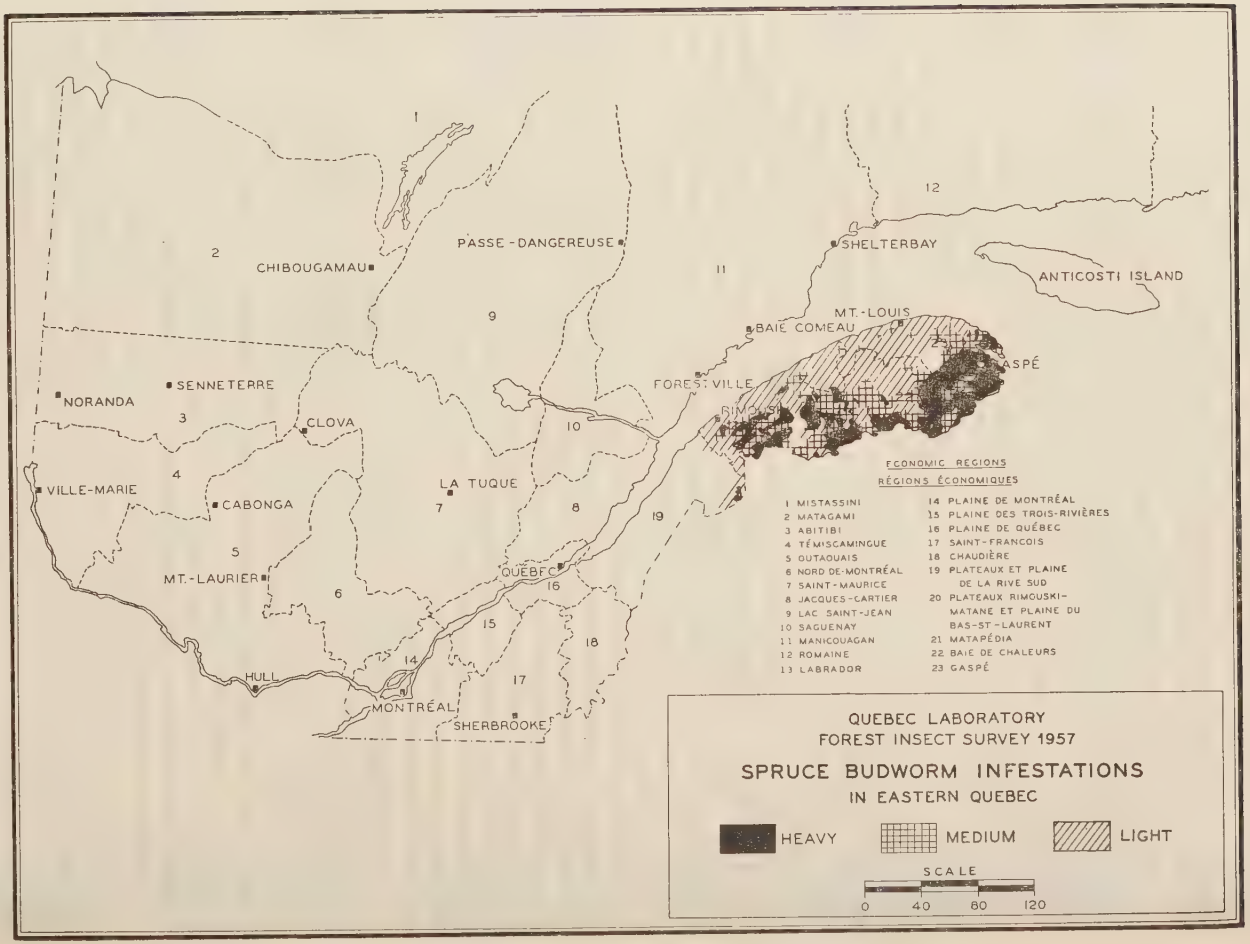
European Spruce Sawfly, *Diprion hercyniae* (Htg.)—Populations of this insect are still low although the reports received in 1957 indicated that it is somewhat more abundant than in previous years throughout the Province, notably in the Gaspe. There was no change in the population in the Quebec-Three Rivers-Megantic area where two generations occur and where special investigations have been conducted since 1955. Approximately 88 per cent of the 572 spruce trees sampled showed evidence of this insect. An average of approximately nine larvae per tree was obtained in 1957 which is close to the average for 1956.

In 1957, beating collections again revealed the presence of diseased and dead larvae in most of the localities sampled. The virus disease was also an important mortality factor in laboratory rearings, although 68 per cent of 2,200 larvae reared spun cocoons. Only one species of parasite, *Drino bohemica* Mesn. was recovered from similar material reared in 1956 and incubated in the spring of 1957.

European Pine Shoot Moth, *Rhyacionia buoliana* (Schiff.)—A survey for the European pine shoot moth was conducted on ornamental pines in the main cities of the Montreal, Quebec, and Sherbrooke area. A marked reduction in populations occurred this year, attributable to the low temperatures recorded during the previous winter. The infestation now varies from light to moderate in Quebec City; only a few specimens were found in Sherbrooke and Montreal. No evidence of this insect was found in other localities visited. In addition to the severe weather, parasites played an important part in control; 33 per cent of the larvae in the 757 shoots examined were parasitized.

Larch Sawfly, *Pristiphora erichsonii* (Htg.)—Sampling in 1957 revealed high numbers in western Quebec. Although the infestation appears to be moving south and east there was little change in the area infested in 1957. The main infestation now extends from the Rouyn-Senneterre area in Abitibi-Est County through Laverendrye Park south to Lacoste and L'Ascension in Labelle County. Throughout this territory the infestation was classified as medium to heavy, except for a small area of severe attack near Senneterre and an area of light to medium attack in Labelle County. Cocoon collections revealed that small mammal predators were important in control; parasitism was generally low.

Eastern Hemlock Looper, *Lambdina fiscellaria fiscellaria* (Guen.)—An infestation of this insect that occasionally develops to epidemic proportions in stands of balsam fir, was reported on the North Shore of the St. Lawrence River in 1956. According to observations made both from the air and the ground, this infestation, centered in the Vachon and May Islands watersheds, covered an area of approximately 56,000 acres of which 768 were severely damaged. Surveys conducted during the summer of 1957 showed that the infestation virtually disappeared in 1957. Practically no eggs could be found in the spring and early summer, and larvae were scarce; about one-half of the larvae collected were parasitized.


CHIBOUGAMAU
PASSE-DANGEREUSE
SHELTERBAY
ANTICOSTI ISLAND
MT.-LOUIS
BAIE COMEAU
GASPÉ
FOREST VILLE
RIMOUSKI
NORANDA
SENNETERRE
CLOVA
VILLE-MARIE
CABONGA
LA TUQUE
MT.-LAURIER
QUÉBEC
HULL
MONTRÉAL
SHERBROOKE
ECONOMIC REGIONS
RÉGIONS ÉCONOMIQUES
1 MISTASSINI
2 MATAGAMI
3 ABITIBI
4 TÉMISCAMINGUE
5 OUTAOUAIS
6 NORD-DE-MONTRÉAL
7 SAINT-MAURICE
8 JACQUES-CARTIER
9 LAC SAINT-JEAN
10 SAGUENAY
11 MANICOUAGAN
12 ROMAINE
13 LABRADOR
14 PLAINE DE MONTRÉAL
15 PLAINE DES TROIS-RIVIÈRES
16 PLAINE DE QUÉBEC
17 SAINT-FRANCOIS
18 CHAUDIÈRE
19 PLATEAUX ET PLAINE DE LA RIVE SUD
20 PLATEAUX RIMOUSKI-MATANE ET PLAINE DU BAS-ST-LAURENT
21 MATAPÉDIA
22 BAIE DE CHALEURS
23 GASPÉ
QUEBEC LABORATORY
FOREST INSECT SURVEY 1957
SPRUCE BUDWORM INFESTATIONS
IN EASTERN QUEBEC
HEAVY
MEDIUM
LIGHT
SCALE
0 40 80 120

PROVINCE OF QUEBEC

FOREST DISEASE SURVEY

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INTRODUCTION

Peculiar weather during the winter and spring of 1957 caused rather extensive injuries to certain conifer and hardwood tree species in Quebec. During this period, the soil covered by only a thin layer of snow was deeply frozen in many areas until June and near drought conditions prevailed until almost mid-month. This resulted in noticeable damage to cedar hedges, to young balsam fir and spruce trees in forest stands, and to a number of hardwood species, especially exotic trees. On the other hand, the cool, wet period which prevailed throughout the Province during most of the summer season favoured tree growth. Except for collections made for specific projects, only a small number of disease samples was handled by the laboratory during 1957.

IMPORTANT DISEASES

Dutch Elm Disease—Laboratory diagnosis of 823 elm samples was carried out during 1957; Dutch elm disease fungus was obtained from 614 samples. All the positive cases discovered during the year in Quebec were found within the area previously known to be infected.

For 12 consecutive years, the six one-square-mile permanent sample plots established in 1946 have been examined for new infections. The 57 positive cases detected and confirmed by laboratory diagnosis in 1957 have increased the loss in the total population of 2,630 elm trees from 228 to 285; the cumulated percentage loss rose from 8.6 in 1956 to 10.8 in 1957. In the buffer zones of one-mile radius around each sample plot, 167 new infected trees were found in 1957 which brought the total number of diseased trees in 12 years to 834 trees. These figures indicate a further intensification of the infection.

General scouting is carried out in only a few cities; records of mortality are limited. In the City of Sherbrooke, however, 151 new infected trees were found in 1957, which increased the number of elm casualties to 1,056 in seven years. In the Town of Grand'Mère 37 infected trees were found in 1956 and 15 in 1957.

Hardwood Dying—During the cool wet seasons of 1956 and 1957, hardwood trees were apparently green and vigorous in most regions of the Province, except in southwestern Quebec in late August. Of the 77 permanent sample plots established in 1953 and 1954, 43 were examined this year. The health of 1,621 white birch and 219 yellow birch trees was little changed from the last observation; some improvement in the appearance of foliage was noticeable. However, in three sample plots located in Abitibi County, crown deterioration had increased significantly since 1954. In one area where ecological studies are being carried out, the condition of 567 white birch trees has changed little since 1955. Similar results were obtained in Laurentide Park where 879 white birch trees were tagged in 1956.

Conifer Decays—During 1956, a total of 2,190 balsam fir, black spruce, and jack pine trees from eight distinctive forest types were analyzed. The number of infections, and the percentage of incidence of decay fungi isolated in culture appear in the following table.

Organism	Balsam fir		Black spruce		Jack pine	
	No.	%	No.	%	No.	%
Coniophora puteana (Fr.) Karst.	15	2.3	3	1.9		
Corticium galactinum (Fr.) Burt	239	35.9	47	30.1		
Fomes pini (Thore ex Fr.) Karst.	2	0.3	17	10.9	20	9.3
Fomes pinicola (Sw.) Cke.	1	0.2				
Lenzites saepiaria Wulf. ex Fr.	1	0.2				
Merulius himantioides Fr.	4	0.3	3	1.9	1	0.5
Odontia bicolor (A.&S. ex Fr.) Bres.	6	0.9				
Polyporus balsameus Pk.	1	0.2	3	1.9		
Polyporus circinatus Fr.	1	0.2	56	35.9		
Stereum chailletii Pers.			1			
Stereum fasciatum (Schw.) Fr.	1	0.2				
Stereum pini (Schleich. ex. Fr.) Fr.					193	90.2
Stereum sanguinolentum A. & S. ex Fr.	373	56.1	9	5.8		
Unknown white butt rots	11	1.6	1	0.6		
Unknown brown butt rots	6	0.9	15	9.6		
Unknown trunk rots	4	0.6	1			

The high incidence of *Stereum pini* in young jack pine trees on the Quebec North Shore is of particular significance. The trunk rot caused by *Stereum sanguinolentum* and the butt rot caused by *Corticium galactinum* are responsible for the greatest losses in balsam fir; *Polyporus circinatus* and *Fomes pini* are the two main decay agents of black spruce.

Diseases in Immature Balsam Fir Stands—The study that was initiated in 1956 of young balsam fir stands on the limits of the Donnacona Paper Company Limited in Laurentide Park was continued in 1957. In 19 sample plots of 0.1 acre, 4,831 trees were examined, cut, and uprooted. The same parasitic foliage diseases observed last year were found in 1957, but with small differences in the percentage of trees infected by each organism: *Phacidium infestans* Karst. 25.1; *Trichosphaeria parasitica* Hart. 17.7; *Lophodermium lacerum* Dark. 37.2; *Lophodermium piceae* Fuckel 16.7; *Hypodermella punctata* Dark. 17.2; *Hypodermella nervata* Dark. 13.3; *Bifusella faullii* Dark. 4.4; *Peridermium balsameum* Pk. 3.9.

The outstanding observation of the 1956 investigation was the numerous root injuries caused by a weevil, *Hylobius pinicola* (Couper), which produced wounds on the root system of 6 to 77 per cent of trees in stands six to 55 years old. Such injuries are infection courts of root and butt decay fungi. This type of injury occurred at about the same frequency in 1957.

Damping-Off of Nursery Seedlings—The damping off-disease of conifer seedlings was closely observed in three nurseries. At Proulx, 10.6 per cent of the white spruce and 45.5 per cent of the red pine seedlings were killed by this disease. At Drummondville, 18.3 per cent of the white spruce and 42.1 per cent of the red pine were lost and in the Berthierville Nursery 43.7 per cent of the white spruce, 55.1 per cent of the red pine and 24.5 per cent of white pine seedlings were killed. The types of fungi isolated were the same as in 1956.

Needle Yellowing of Jack Pine—In 1956, striking needle yellowing of jack pine was reported in the upper St. Maurice area. Re-examination of 393 trees in 12 sample plots established that year revealed that little or no needle yellowing occurred on the 1956 and 1957 shoots. Evidently the unhealthy appearance of needles noticed last year resulted from the dry hot summer of 1955.

Winter Drought—Discolouring of the foliage of conifers was particularly evident during the spring and summer of 1957 in several areas of Quebec. Balsam fir in the Laurentide Park and Eastern Townships, and ornamental cedar trees in most regions were affected most noticeably. This type of injury was similar to that which occurred in 1956 and was attributed to the dry spell which lasted from mid-winter to June while the ground was deeply frozen. The same conditions seem to have caused heavy dieback of Norway maple saplings in a Montreal nursery.

A special survey of balsam fir and black spruce was carried out in the limits of the Ste. Anne Pulp and Paper Co. in Laurentide Park. A total of 1,090 trees were examined, 1,034 balsam fir and 56 black spruce, in nine sample plots. The average height of the trees was 5.5 feet, the average diameter 1.5 inches, and the average age 10 years. Thirty-nine per cent of the balsam fir and 59 per cent of the black spruce trees had dead tops. Only the 1956 growth of the black spruce trees was killed but on balsam fir trees the dying reached the 1955 and 1954 whorls and in a few cases even to 1953 and 1952 growth.

PROVINCE OF ONTARIO

FOREST INSECT SURVEY

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INTRODUCTION

Five major forest insect pests were prevalent in Ontario in 1957 of which the first and most important was the spruce budworm. During the past three years it has spread to the east and south across Fort Frances District at an alarming rate and presently threatens extensive stands of fir and spruce in western Ontario. There are no indications that this active outbreak is waning. Secondly, the pine root-collar weevil has become a serious menace to pine plantations in central and southern Ontario, particularly those with a high percentage of Scots pine growing on sandy soils. The discovery of three new pockets of infestations in the Pembroke District in 1957 and continued heavy mortality in infested plantations in Lake Simcoe District emphasize its importance as a pest of Scots pine plantations. The third major pest, the larch sawfly, occurred in outbreak proportions in much the same intensity in the same areas as 1956. The continued eastward spread of the European pine sawfly and an increase in the area of severe defoliation focussed greater attention on this fourth important insect pest. The European pine shoot moth remained an important nursery and plantation problem, although it was less abundant in some areas in 1957.

The 1957 season was marked more for the abundance of numerous insects of lesser importance than for changes in the prevalence of well-known and economically important forest pests. Information on insects of a restricted or local nature such as the introduced pine sawfly, *Diprion similis* (Htg.) in the Lake Huron District; eastern spruce bark beetle, *Dendroctonus piceaperda* Hopk., in the Tweed District; and the sugar-maple borer, *Glycobius speciosus* (Say) in the Kemptville District, may be obtained from the Forest Insect Laboratory.

Within the framework of the Forest Insect Survey a study of the parasite complex of the forest tent caterpillar in the years 1951-56 was completed. Investigations into the distribution of Swaine's sawfly and into the life history of a pine bud moth were also completed. A study was made on the life history and biology of a birch leaf miner *Profenusa alumna* (MacG.), and projects on the parasites of the European pine shoot moth and on the morphology of the Swaine's sawfly larva were continued in 1957.

A total of 8,915 collections was received at the Forest Insect Laboratory, Sault Ste. Marie, of which Forest Biology personnel collected 8,261. The remainder came from personnel of the Ontario Department of Lands and Forests, woods operating companies, and other co-operating agencies and individuals who assisted in this and other ways. Insect collections were distributed among the principal host trees as follows:

Coniferous Trees	Collections	Broad-leaved Trees	Collections
Pine		Poplar	
Jack pine	1,203	Trembling aspen	1,018
Red pine	440	Balsam poplar	167
Scots pine	181	Large tooth aspen	37
White pine	178	Miscellaneous poplars	37
Miscellaneous pines	7		
	2,009		1,259
Larch	838		

Coniferous Trees	Collections		Broad-leaved Trees	Collections	
Spruce			Birch		
White spruce	631		White birch	661	
Black spruce	183		Yellow birch	33	
Miscellaneous spruces	40		Miscellaneous birches	17	
		854			711
			Cherry		555
Balsam fir		352	Alder		362
			Willow		528
Cedar			Maple		
Eastern white cedar	189		Red maple	106	
Northern red cedar	5		Sugar maple	58	
Miscellaneous cedars	4		Miscellaneous maples	31	
		198			195
			Elm		259
Hemlock		20	Oak		
Total		4,271	Red oak	87	
			White oak	62	
			Miscellaneous oaks	36	
					185
Miscellaneous hosts or hosts unspecified		162	Walnut, butternut, hickory		87
			Ash		55
			Basswood		45
			Miscellaneous broad-leaved trees		241
			Total		4,482

Grand Total 8,915

IMPORTANT INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)—The most important change in the current spruce budworm outbreaks in Ontario occurred in the Western Region. Heavy infestations which have spread rapidly to the south and eastward in the Fort Frances District since 1954, extended into the Port Arthur District in 1957. However, there was little change in the extent and intensity of infestations in the Kenora and Sioux Lookout districts compared with 1956.

The new area of heavy infestation was bounded roughly by Lac La Croix, Basswood and Sturgeon lakes in the Fort Frances District. To the east it extended into the Port Arthur District north of Saganaga Lake where heavy infestation occurred over an area of approximately 120 square miles. Farther north, the eastward extension into Port Arthur District, in the Pyramid Lake area remained unchanged, but here the infestation has increased from medium to heavy. The location and extent of all infestations in Ontario are shown on the accompanying map.

The three areas of heavy infestation persisting north of Lake Superior in the Port Arthur and Geraldton districts showed little change in total extent compared with 1956. These were located on Sibley and Black Bay peninsulas and north of Pays Plat, the last named extending roughly from Pays Plat east to Township 84 and north to Roslyn Lake.

Populations in the Northern Forest Region declined to the lowest point in recent years. Small numbers of larvae were found in the western part of the Kapuskasing District where light infestations had occurred in 1956, and the infestations subsided in the Syderre Township area along the boundary of the Kapuskasing and Cochrane districts.

In southern Ontario pockets of infestation persisted in Admaston Township, Tweed District, and in the Uxbridge Forest, Lake Simcoe District. The heavy infestation in a dense stand of white spruce at Uxbridge has shown little change in the past several years but the infestation in a narrow stand of white spruce and balsam fir in Admaston Township declined to light intensity in 1957.

Heavy host tree mortality occurred farther to the south and east of Sioux Lookout compared with 1956, also in an east-west band north of Dryden in the Kenora District, and in a larger number of pockets immediately north of Lake of the Woods. Otherwise known extensions in the boundaries of heavy mortality were minor.

Fort Frances	56	Port Arthur	37
Geraldton	56	Sault Ste. Marie	1
Kapuskasing	5	Sioux Lookout	47
Kemptville	2	Sudbury	12
Kenora	44	Tweed	10
Lake Simcoe	3	White River	2
Lindsay	1		

Pine Root Collar Weevil, *Hylobius radicis* Buch.—Detection surveys in 1957 revealed several changes in the known distribution of this weevil in Ontario. In all infestations examined, Scots pine trees suffered most severe injury, although adjacent red pines were usually also infested.

New infestations were detected in the western part of Tiny Township, Lake Simcoe District, where many trees from Wyeville north to Lafontaine were seriously affected. Further mortality of Scots pine plantings has occurred along Balm Beach since surveys were carried out in 1956. Little or no change has been noted in the extent of the infestation in the Angus area west of Barrie.

Four pockets of infestation were found in Scots pine plantations in the Pembroke District where considerable tree mortality has occurred. These were located in Petawawa, Westmeath, and Hagarty townships.

Pembroke	3

Larch Sawfly, *Pristiphora erichsonii* (Htg.)—There was less change in the distribution and intensity of infestations in Ontario as a whole in 1957 than at any time during the past decade. The general spread of larch sawfly infestations to the east and south began in 1948 and had resulted in widespread defoliation of larch as far south as the North Bay District in 1956; the spread was less pronounced in 1957.

Light-to-medium infestations occurred from the Kapuskasing District west to the Manitoba boundary except in the western part of the Fort Frances District and at six points in the Kenora District where heavy infestations were reported. In adjacent areas to the east and south in the Cochrane and Gogama districts, populations declined considerably from 1956 levels although pockets of heavy defoliation persisted north and west of Lake Abitibi. In contrast, medium-to-heavy infestations occurred at many points through central Ontario between Lake Superior and the Quebec border. In southern Ontario, light infestations were again common.

Chapleau	43	Lindsay	18
Cochrane	59	North Bay	20
Fort Frances	38	Parry Sound	30
Geraldton	45	Pembroke	17
Gogama	51	Port Arthur	46
Kapuskasing	48	Sault Ste. Marie	63
Kemptville	11	Sioux Lookout	21
Kenora	14	Sudbury	27
Lake Erie	3	Swastika	39
Lake Huron	16	Tweed	16
Lake Simcoe	33	White River	24

European Pine Sawfly, *Neodiprion sertifer* (Geoff.)—The eastward spread in the distribution of this introduced sawfly continued in southern Ontario in 1957 with about the same alarming rapidity as in the past several years. Changes in the known range of this sawfly in southwestern Ontario since 1950 are shown in the accompanying map. New areas of infestation occurred mainly in Dufferin and Peel counties in the Lake Simcoe District and in Wellington and Halton counties in the Lake Huron District. In 1957 larval colonies were observed in southwestern Ontario east to a line roughly through Port Credit, Orangeville, and thence north and west to Owen Sound. This new range of distribution represents an easterly spread beyond the 1956 boundary in a band approximately 20 miles wide extending from Lake Ontario to Melancthan Township in Dufferin County. In this area light infestation was recorded.

Control measures using chemicals or virus sprays were used in numerous pine plantations to good advantage; however, severe defoliation of hard pines occurred in many untreated areas, particularly in the Lake Huron District.

Lake Erie	25	Lake Simcoe	14
Lake Huron	34		

European Pine Shoot Moth, *Rhyacionia buoliana* (Schiff.)—There was a marked decline in the intensity of attack and in the number of late larvae and pupae of the European pine shoot moth in 1957. This trend was attributed only in part to overwintering mortality, predation, and insect parasitism; unknown factors were responsible for a high rate of larval mortality during the early summer. Plantations in the eastern part of the Lake Erie District, and in adjacent counties of the Lake Huron and Lake Simcoe districts that had been heavily infested for several or more years, suffered only light damage in 1957. Marked population declines were also reported in the Lindsay District.

Despite the trends indicated above, large numbers of the 1957-58 generation survived at some locations. It is therefore unlikely that the infestation has suffered any permanent set-back. Some of the pine plantations in which damage was reduced in 1957 showed encouraging recovery.

Lake Erie	4	Lake Simcoe	10
Lake Huron	12	Lindsay	1

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.)—The largest outbreak of this leaf-roller so far detected by the Forest Insect Survey in Ontario began in 1956 and developed over extensive areas in 1957. The greatest increases in the extent and intensity of infestations took place in north-central Ontario where defoliation of trembling aspen stands ranged up to 80 per cent on mature trees and to complete stripping of smaller trees.

A heavy infestation along the international border in the Port Arthur District extended in a band 1 to 2 miles wide from the Cascades east to the southeast shore of Lenore Lake, and south to Pigeon River. Moderate to heavy defoliation of trembling aspen prevailed in the southeastern part of the White River District; in the northwestern, central, and southeastern sections of the Chapleau District; in numerous pockets in the southern half of the Sault Ste.

Marie District; in the central and southern parts of the Gogama District; in extensive areas in the western and northern parts of Sudbury District and on Manitoulin Island; and in the Iroquois Falls area of the Cochrane District. Heavy infestations continued for the second year in aspen stands southwest of Savant Lake in the Sioux Lookout District.

Chapleau	31	Port Arthur	9
Cochrane	2	Sault Ste. Marie	24
Geraldton	9	Sioux Lookout	5
Gogama	17	Sudbury	41
Kapuskasing	3	Swastika	2
North Bay	1	White River	8
Parry Sound	3		

Pine Tortoise Scale, *Toumeyella numismaticum* (P. & M.)—No infestations of this scale were found in northern Ontario in 1957 although in some cases host tree mortality continued in stands adversely affected by the 1955 outbreak. Some jack pine stands near Block 6 in the Sioux Lookout District that were not surveyed in 1956 showed typical damage and tree mortality. In the Port Arthur District numerous stands of jack pine trees along the Dog and Roaring rivers and in Block 6, which appeared to be in a weakened and dying condition in 1956, were dead in 1957. In the Central Region, tree mortality remained light at the headwaters of the Batchewana and Montreal rivers in the Sault Ste. Marie District, and increased only slightly in the Chapleau District where mortality in some stands reached 23 per cent by volume.

Kenora	3	Port Arthur	1
Kemptville	2	Sioux Lookout	1

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—The infestations that were forecast for 1957 along the Albany River watershed in Sioux Lookout District reached much lower intensity than expected. Only one small area of heavy infestation persisted south of Lake St. Joseph between Dawson and Pashkokogan lakes, and smaller pockets of infestation occurred at Ochig and McCrea lakes, north and south of Lake St. Joseph. This reduction in infestation resulted mainly from the failure of viable eggs to hatch in the spring of 1957. Egg-bands that were collected in the fall of 1956 and stored at 32°F. during the winter months showed an average hatch of more than 75 per cent when they were incubated in March; bands collected early in the summer of 1957 from the same location, excepting Lake St. Joseph, showed less than 3 per cent hatch. Most unhatched eggs contained fully-developed larvae. Unusual weather conditions in the spring of 1957 may have caused this mortality. Based on surveys carried out in the fall, a further decline in population is expected in 1958. The few small remnants of the 1948-56 outbreak which persisted in northeastern Ontario in 1956 have now disappeared.

Cochrane	4	North Bay	9
Kapuskasing	1	Parry Sound	1
Kemptville	1	Sioux Lookout	21
Kenora	3	Swastika	10
Lake Huron	1		

Eastern Tent Caterpillar, *Malacosoma americanum* (F.)—The population of this insect declined markedly from 1954 to 1956, and remained small in 1957. Except in the southern part of the Parry Sound District where a light infestation occurred, only scattered colonies were observed within its range in central and southern Ontario.

Lake Erie	8	North Bay	2
Lake Huron	4	Parry Sound	24
Lake Simcoe	6	Sudbury	12
Lindsay	3		

Fall Webworm, *Hyphantria cunea* (Drury)—Colonies were more common than in 1956 over a large part of the Province; greatest increases occurred in western, central, and southern Ontario. Heavy infestations were reported in the Lake of the Woods area, Kenora District; along shorelines and on islands in the western part of Rainy Lake, Fort Frances District; and in the southern counties of the Lake Simcoe District.

Chapleau	19	North Bay	17
Cochrane	2	Parry Sound	17
Fort Frances	27	Pembroke	31
Gogama	17	Port Arthur	9
Kemptville	21	Sault Ste. Marie	53
Kenora	10	Sioux Lookout	1
Lake Erie	23	Sudbury	24
Lake Huron	15	Tweed	20
Lake Simcoe	26	White River	1
Lindsay	9		

Spring Cankerworm, *Paleacrita vernata* (Peck)—Generally, infestations reported in the Lake Simcoe and Lake Huron districts in 1956 maintained themselves or increased in intensity in 1957. Severe defoliation of elm trees recurred near Craighurst in Vesper Township. New heavy infestations occurred on roadside trees in Nassagaweya and Esquesing townships west of Georgetown in the Lake Huron District, and at several points in Peel and York counties in the Lake Simcoe District. Single and small groups of elms were severely defoliated at widely separated points in the Lindsay and Tweed districts.

Lake Huron	6	Lindsay	1
Lake Simcoe	9	Tweed	1

Fall Cankerworm, *Alsophila pometaria* (Harr.)—This pest caused heavy defoliation of white elm, basswood, and Manitoba maple shade trees in the towns of Fort Frances and Kenora in western Ontario. It was also numerous at points in the Lake Simcoe and Lake Huron districts where heavy infestations of the spring cankerworm occurred.

Fort Frances	2	Lake Simcoe	1
Kenora	3	Lindsay	2
Lake Erie	3	Tweed	2
Lake Huron	1		

Walnut Caterpillar, *Datana integerrima* G. &. R.—Following a slight decline in 1956, the numbers of this insect increased in southwestern Ontario in 1957. Heavy defoliation of host trees occurred south of Highway 7 in the Lake Simcoe District, across the southern part of the Lake Huron District, and in the western half of the Lake Erie District. Throughout most of the remainder of these three districts, occasional black walnut trees were defoliated.

Lake Erie	24	Lindsay	2
Lake Huron	7	Tweed	1
Lake Simcoe	2		

Yellow-necked Caterpillar, *Datana ministra* (Drury)—Numerous infestations were found on roadside plantings and on trees along fence-rows in the Southwestern Region in 1957. White elm trees along Highway 401 east of Toronto were heavily defoliated by early August. Notable infestations also occurred along Highway 2 near Tilbury, along the Queen Elizabeth Way between Grimsby and St. Catherines, and between Bronte and Oakville. Larval collections

were made at numerous locations in Dufferin, Peel, Norfolk, and Haldimand counties. Light defoliation of various deciduous trees was reported at widely-scattered points in the Southeastern Region and in three townships south of Cochrane.

Chapleau	3	Parry Sound	2
Cochrane	4	Pembroke	1
Lake Erie	19	Sault Ste. Marie	4
Lake Huron	5	Sudbury	6
Lake Simcoe	3	Swastika	2
Lindsay	3	Tweed	7
North Bay	7		

Green-striped Mapleworm, *Anisota rubicunda* (Fabr.)—The population of this defoliator in 1957 was generally less than in 1956. In the North Bay District, infestations declined from heavy to moderate intensity in Notman Township and to light intensity in numerous other areas. In the Pembroke District the severe infestations of 1956 virtually disappeared in 1957.

Areas of heavy infestation were limited to Lac LaCroix and Calm Lake in the Fort Frances District and to Waters, Dill, and Burwash townships, Sudbury District. Medium infestations occurred in Township 120, Sudbury District; in Shawanaga Township, Parry Sound District; and along Highway 2, between Delaware and Chatham. Light infestations were located in many of the districts named and also in the Swastika and Gogama districts. In all cases, red maple was the preferred host.

Fort Frances	4	Parry Sound	8
Gogama	7	Sault Ste. Marie	13
Lake Erie	11	Sudbury	25
Lindsay	1	Swastika	3
North Bay	16		

Orange-striped Oakworm, *Anisota senatoria* (J. E. Smith)—Heavy defoliation of white oak trees was observed in several areas in southern Ontario: along county roads in Saltfleet and Binbrook townships, Lake Huron District; in a 20-acre stand in Murray Township, Lindsay District; and in woodlots and wooded pasture lands in Tyendinaga and Ameliasburgh townships, Tweed District. In the Lake Erie District, several bur oak trees in Townsend Township were heavily attacked and various white oaks in Yarmouth Township were moderately defoliated by this insect. Light feeding has been observed near Grand Bend each year since 1955.

Lake Erie	19	Lindsay	3
Lake Huron	6	Tweed	2

Red-humped Caterpillar, *Schizura concinna* (J. E. Smith)—This insect was generally more abundant on trembling aspen and willow trees than for many years. Single and small groups of trees were severely defoliated at Sturgeon Narrows in the Fort Frances District and at numerous points in the Sudbury, North Bay, Pembroke, and Parry Sound districts.

Fort Frances	5	Parry Sound	10
Kemptville	2	Pembroke	12
Kenora	9	Sault Ste. Marie	5
Lake Erie	3	Sioux Lookout	1
Lake Huron	1	Sudbury	15
Lake Simcoe	4	Tweed	5
North Bay	7		

Spruce Bud Moth, *Zeiraphera ratzeburgiana* Ratz.—Heavy infestations persisted on white spruce trees in the Port Arthur area and along the lower reaches of the Mississagi River in the Sault Ste. Marie District. A moderate

infestation occurred near Elsas in the Gogama District for the second consecutive year. *Z. ratzeburgiana* in association with *Zeiraphera fortunana* Kft. caused severe bud damage on white spruce trees bordering a red pine plantation in Glenelg Township, Lake Huron District. Light feeding was reported in the central and eastern parts of the Sudbury District, and on Manitoulin Island.

Geraldton	2	Parry Sound	1
Gogama	1	Port Arthur	19
Lake Huron	1	Sault Ste. Marie	3
North Bay	1	Sudbury	7

Cherry Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch) —Numbers of this pest of cherry and other shrubs increased sharply in 1957. Pockets of medium or heavy infestation occurred at many points in northern and southern Ontario. Collections were received from all districts in the Province as follows:

Chapleau	2	Lindsay	6
Cochrane	8	North Bay	3
Fort Frances	5	Parry Sound	10
Geraldton	4	Pembroke	6
Gogama	1	Port Arthur	14
Kapuskasing	5	Sault Ste Marie	35
Kemptville	4	Sioux Lookout	15
Kenora	2	Sudbury	1
Lake Erie	2	Swastika	4
Lake Huron	11	Tweed	5
Lake Simcoe	3	White River	1

Red-headed Pine Sawfly, *Neodiprion lecontei* (Fitch)—Chemical control measures were used successfully in many plantations in 1956 and high egg parasitism contributed substantially to the decline in the severity of infestations in parts of the Southwestern Region in 1957. This sawfly, however, remained a serious threat to young hard pine plantations in the southern half of Ontario.

Heavy infestations were reported in a red pine plantation in Sullivan Township, Lake Huron District; in parts of the Silver Creek Tract of the Drury Forest, Lake Simcoe District; between Huntsville and Bracebridge, Parry Sound District; and at several locations in the southeastern part of the Pembroke District. In the southern part of the Sault Ste. Marie and Sudbury districts there was an upward trend in population; light-to-medium infestations occurred along Highway 17 and in Jocelyn Township on St. Joseph Island in the former district. In the Sudbury District medium infestations were observed in red pine plantations in Tennyson, May, and Victoria townships. Colonies of larvae in the North Bay District occurred more often than in 1956.

Kemptville	23	Parry Sound	34
Lake Erie	1	Pembroke	35
Lake Huron	6	Sault Ste Marie	20
Lake Simcoe	12	Sudbury	23
Lindsay	10	Tweed	22
North Bay	15		

Red-headed Jack-pine Sawfly, *Neodiprion virginianus* complex—Infestations were more widely distributed in Ontario than those of any other species of pine sawfly in 1957, occurring on jack pine trees in many areas from the Sioux Lookout District east to the Tweed District. In most cases only small groups of open-grown trees were affected.

A heavy infestation occurred at Wild Goose east of Port Arthur. The heavy infestations reported in 1956 at Kakabeka Falls, northwest of Port Arthur and in Richardson Township, Fort Frances District, declined to light and medium intensities respectively. There was evidence of wide distribution elsewhere in the Province; the insect occurred in pockets of medium infestation in

the Sioux Lookout, Chapleau, Gogama, North Bay, Lake Simcoe, and Tweed districts. Light infestations were observed at many points in other districts.

Chapleau	29	Parry Sound	17
Cochrane	11	Port Arthur	12
Fort Frances	7	Sault Ste Marie	15
Geraldton	5	Sioux Lookout	4
Gogama	29	Sudbury	24
Kapuskasing	4	Swastika	3
Lake Simcoe	4	Tweed	5
North Bay	8	White River	9

Balsam-fir Sawfly, *Neodiprion abietis* (Harr.)—Open-grown balsam fir trees suffered moderate-to-heavy defoliation in Brant Township, Lake Huron District; in Gloucester Township, Kemptville District; and in Harron and McNabb townships, Tweed District, in May and June. Elsewhere in Ontario, populations declined for the third consecutive year.

Fort Frances	3	Lindsay	5
Geraldton	1	North Bay	3
Kapuskasing	1	Parry Sound	1
Kemptville	9	Port Arthur	3
Kenora	2	Sioux Lookout	1
Lake Huron	8	Tweed	6
Lake Simcoe	2		

Swaine Jack-pine Sawfly, *Neodiprion swainei* Midd.—Populations of this native sawfly differed in western and east-central Ontario. In the Western Region larval colonies were rarely found, but in numerous areas in the Central and South-central regions, the sawflies were more abundant than in 1956.

Medium-to-heavy infestations occurred east of Gogama and at Beaver Lake in the Gogama District, and on islands in Banks Lake along the Swastika-North Bay district boundary. Light infestations were observed at numerous points in the southern part of the Chapleau District and in the northern half of the Sudbury District. Colonies of larvae were observed more commonly in the Parry Sound District than in recent years.

Chapleau	17	Parry Sound	9
Fort Frances	1	Sault Ste. Marie	14
Gogama	25	Sudbury	21
North Bay	28	Swastika	7

Black-headed Jack-pine Sawfly, *Neodiprion pratti banksianae* Roh.—The number of colonies of this sawfly declined in most districts compared with 1956. This trend has been most pronounced in the area north and west of Pembroke and on Great Cloche Island, Sudbury District, where infestations have persisted for several years. The only heavy infestations reported in 1957 occurred near Orillia, Lake Simcoe District; in Kitley and Finch townships, Kemptville District; and on two small islands in Lake Nipissing, North Bay District.

Chapleau	18	Parry Sound	10
Cochrane	5	Pembroke	3
Fort Frances	9	Port Arthur	3
Geraldton	3	Sault Ste. Marie	1
Kemptville	6	Sioux Lookout	12
Kenora	16	Sudbury	6
Lake Huron	17	Tweed	6
Lake Simcoe	6	White River	4
North Bay	2		

European Spruce Sawfly, *Diprion hercyniae* (Htg.)—No major change in the status of this introduced insect in Ontario was determined in 1957. Although, beating samples revealed minor increases in the Sault Ste. Marie, Lake Huron Lake Simcoe, and Tweed Districts, counts in other districts were lower than, or similar to, those made in 1956.

Cochrane	2	North Bay	16
Fort Frances	13	Parry Sound	18
Kemptville	12	Pembroke	25
Lake Erie	3	Sault Ste. Marie	11
Lake Huron	6	Sudbury	5
Lake Simcoe	13	Swastika	3
Lindsay	17	Tweed	13

A Leaf-folding Sawfly, *Nematus* sp.—This unidentified species of sawfly occurred commonly on trembling aspen, balsam poplar and willow trees in many parts of the Northern, Central and South-Central regions. Except in the Cochrane District where numbers rose sharply in 1957, infestation intensities were similar to 1956. Moderate-to-heavy infestations occurred in widely separated areas in the above district and in the Kapuskasing, Chapleau, Gogama, Pembroke, and Parry Sound districts. Elsewhere in these general areas infestations were usually light.

Chapleau	15	North Bay	24
Cochrane	25	Parry Sound	12
Geraldton	4	Pembroke	38
Gogama	27	Port Arthur	3
Kapuskasing	42	Sault Ste. Marie	13
Kemptville	4	Sioux Lookout	8
Kenora	3	Sudbury	16
Lake Erie	1	Swastika	17
Lake Huron	4	Tweed	3
Lindsay	7	White River	48

Yellow-headed Spruce Sawfly, *Pikonema alaskensis* (Roh.)—This insect is a frequent pest of small spruce trees in clear-cut areas, along roads and lakeshores, and in plantations. Pockets of heavy infestation occurred at many points in 1957. The most important outbreaks occurred in an eight-acre white spruce plantation near Grand Valley, Lake Simcoe District; in Tract 7, Main County Forest in Glenelg Township, Lake Huron District; and in several plantations in Walford and Lanark townships, Kemptville District. Small pockets of defoliation occurred at many points in northern Ontario.

Chapleau	17	North Bay	23
Cochrane	21	Parry Sound	25
Fort Frances	11	Pembroke	23
Geraldton	2	Port Arthur	15
Gogama	9	Sault Ste. Marie	15
Kapuskasing	2	Sioux Lookout	6
Kemptville	19	Sudbury	18
Kenora	10	Swastika	16
Lake Huron	11	Tweed	6
Lake Simcoe	12	White River	8
Lindsay	7		

Mountain-ash Sawfly, *Pristiphora geniculata* (Htg.)—Previously the known range of the mountain-ash sawfly in Ontario was south of Lake Nipissing. In 1957, typical feeding was found in the western part of the Sudbury District and larvae were collected in the southern part of the Sault Ste. Marie District.

North of Thessalon, in the latter area, severe defoliation of mountain-ash trees was observed frequently. Moderate to heavy infestations occurred at numerous points in southern Ontario.

Lake Erie	1	Parry Sound	10
Lake Simcoe	6	Pembroke	3
Lindsay	7	Sault Ste. Marie	5
North Bay	6	Tweed	1

An Alder Sawfly, *Arge* sp.—Infestations of this close relative of *Arge pectoralis* (Leach) were found mainly on speckled alder along the shores of lakes and rivers in widely separated areas in central Ontario. Moderate-to-heavy infestations were observed along the banks of the Batchewana River, Sault Ste. Marie District; in parts of Chaplin, Pattinson, and Rollo townships, Chapleau District; on the shores of Kapuskasing and Kyushk lakes, Gogama District; in Nameigos Township, White River District; and on Wicksteed Lake, North Bay District.

Chapleau	38	Parry Sound	1
Gogama	14	Pembroke	2
Kapuskasing	2	Sault Ste. Marie	4
Lake Erie	1	Sioux Lookout	1
Lake Huron	2	Swastika	4
North Bay	1	White River	10

A Leaf Miner on Birch, *Profenusa alumna* (MacG.)—Conspicuous mining by this sawfly occurred in white birch stands in one area in the Cochrane District, in parts of the Central and South-central regions, and in the northern part of the Lake Huron District. Understory trees and the lower branches of larger trees were most heavily infested.

Heavy infestations persisted in the Montreal River area north of Sault Ste. Marie and on the Bruce Peninsula. Leaf-mining in the Gogama District declined to light intensity but new heavy infestations were reported in the central part of the Sudbury District, in the North Bay District, and in Tisdale and Mountjoy townships in the Cochrane District.

Chapleau	26	Parry Sound	7
Cochrane	7	Pembroke	4
Gogama	13	Sault Ste. Marie	29
Kapuskasing	4	Sudbury	9
Kemptville	2	Swastika	5
Lake Huron	1	Tweed	2
Lindsay	2	White River	4
North Bay	21		

Birch Leaf Miner, *Fenusa pusilla* (Lep.)—Large populations persisted for the third consecutive year on wire birch stands in Dundas, Grenville, Glengarry, and Stormont counties in the Kemptville District. On the other hand, the pockets of medium-to-heavy infestation on white birch that were reported in the North Bay and Parry Sound districts in 1956 failed to develop in 1957. Light-to-medium infestations occurred in numerous areas in the Pembroke District.

Kemptville	7	North Bay	1
Lake Erie	1	Parry Sound	6
Lake Huron	1	Pembroke	7
Lake Simcoe	3	Sudbury	10
Lindsay	10	Tweed	4

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.—The only infestations reported in 1957 were on white and wire birch in North Walsingham, Charlotteville, Middleton, and South Norwich townships in Norfolk and Oxford counties.

Fort Frances	1	Lake Huron	2
Kenora	1	Sioux Lookout	2
Lake Erie	2		

European Elm Leaf Beetle, *Galerucella xanthomelaena* (Schr.)—No change in the distribution of this introduced leaf beetle was noted in southern Ontario. The decline in population reported for the Niagara Peninsula in 1956 continued in 1957. Farther west in Lake Erie District in the towns of St. Thomas and Tecumseh, light defoliation occurred, and a few beetles were found in the Essex area. Light feeding was also noted in the Town of Cobourg.

Lake Erie	11	Lindsay	1

American Poplar Leaf Beetle, *Phytodecta americana* (Schffr.)—This beetle was prevalent in many areas of northern Ontario in 1957. Heavy infestations occurred in pockets of small trembling aspen in Kenora, Port Arthur, Chapleau, and Gogama districts. Light-to-medium infestations were observed in Geraldton, White River, Sudbury, and North Bay districts.

Chapleau	46	Lindsay	1
Cochrane	10	North Bay	6
Fort Frances	1	Parry Sound	13
Geraldton	2	Pembroke	1
Gogama	13	Port Arthur	1
Kapuskasing	10	Sault Ste. Marie	1
Kemptville	7	Sioux Lookout	18
Kenora	2	Swastika	13
Lake Huron	3	White River	16
Lake Simcoe	2		

Black Army Cutworm, *Actebia fennica* (Tausch.)—In the spring of 1957 a spectacular outbreak of this cutworm was reported in a 1955 burn north of Mount Lake in the Sault Ste. Marie District. Virtually all succulent vegetation in the area was consumed, including the buds and young leaves of shrubs missed by the fire. Also eaten were the foliage of root- and stump-suckers, and all annual and perennial plants except grasses. A red pine planting established in the area in 1956 was also severely attacked; a survey made in October showed that up to 40 per cent of the planted trees had been killed.

This climbing cutworm is a common pest of blueberries, and is usually most abundant on commercial crops the year following controlled burning. It is probably significant that this outbreak occurred in a spring burn that was surrounded by an extensive area burned over in 1948 and in which blueberry bushes were abundant.

Sault Ste. Marie	8

White-pine Shoot Borer, *Eucosma gloriola* Heinr.—The occasional brown flagging of Scots, red, and white pines through central and southern Ontario resulting from attack by this insect prompted numerous inquiries. It is seldom a pest of "closed" plantations, and on young trees it can usually be controlled by removing and burning the infested shoots as soon as the damage appears and before the larvae become fully grown and drop to the ground.

Lake Erie	1	Sault Ste. Marie	3
Lindsay	1	Sudbury	1

Larch Twig Borer, *Argyresthia laricella* Kft.—As a result of intensive surveys in 1956 and 1957, this insect is now known to occur throughout Ontario except in the districts of White River, Kapuskasing, Cochrane, Chapleau, Gogama and Sudbury.

Counts of the infested shoots on ten trees in a plantation of 18-foot European larch in the Lake Erie District averaged 94 per tree.

Fort Frances	3	Lindsay	8
Kemptville	4	Parry Sound	3
Kenora	5	Pembroke	1
Lake Erie	4	Sioux Lookout	2
Lake Huron	5	Tweed	9
Lake Simcoe	2		

Spruce Coneworm, *Dioryctria abietella* (D. & S.)—There was an eightfold increase in the number of collections received in 1957 compared with 1956. The insect commonly was found infesting wounds on coniferous trees, in old galleries of the European pine shoot moth, in association with white pine weevil damage, and was reported for the first time attacking the tips of pruned Scots pine trees.

Chapleau	3	Parry Sound	10
Cochrane	13	Pembroke	5
Kapuskasing	10	Port Arthur	3
Kemptville	2	Sault Ste. Marie	19
Kenora	5	Sudbury	4
Lake Simcoe	2	Swastika	3
Lindsay	1	Tweed	2
North Bay	6		

Jack-pine Needle Miner, *Exoteleia pinifoliella* (Cham.)—Two small but heavy infestations were observed in 1957, in Finch Township, Kemptville District, and in Clarke Township, Lindsay District. Large numbers of this needle miner have been present on open-grown jack pine trees in parts of the North Bay and Parry Sound districts for at least the past two years.

Geraldton	1	Parry Sound	6
Kemptville	5	Sioux Lookout	1
Lindsay	5	Sudbury	2
North Bay	6	Tweed	1

An Arborvitae Leaf Miner, *Argyresthia aureoargentella* Brower—This minute insect was recorded for the first time in Ontario in 1957. Collections were received from the following districts:

Chapleau	4	Sault Ste. Marie	9
Gogama	2	Sudbury	3
North Bay	2	White River	10
Parry Sound	2		

Aspen Blotch Miner, *Lithocolletis salicifoliella* Cham.—Heavy mining persisted in numerous areas in the eastern part of the Kenora and Fort Frances districts in 1957. Elsewhere in northern Ontario infestations were generally light.

Chapleau	12	North Bay	5
Cochrane	1	Pembroke	3
Fort Frances	24	Port Arthur	9
Geraldton	36	Sioux Lookout	28
Gogama	5	Swastika	2
Kapuskasing	9	White River	26
Kenora	12		

Pine Spittlebug, *Aphrophora parallela* (Say)—In recent years a marked increase in the prevalence of this spittle bug in southwestern Ontario has become apparent. In 1957, increases of major importance were evident mainly in older Scots pine plantations throughout the Lake Simcoe and Lake Huron districts. Heavy infestation caused a thinning of foliage and considerable branch-killing; some trees have died.

In Vivian Forest, a 30-year-old stand on a poor site, which had been heavily attacked for three consecutive years, showed approximately 30 per cent mortality. Heavy infestations causing less severe damage occurred in Uxbridge Forest, Ontario County; in the Kirkwall Tract, Wentworth County; in Colborne Township, Huron County; and in a roadside plantation in Keppel Township, Grey County. Typical damage to Scots pine trees was also noted in Townsend Township, Lake Erie District, and in the Turkey Point Nursery, St. Williams Forestry Farm.

Chapleau	4	Pembroke	1
Fort Frances	5	Port Arthur	2
Gogama	16	Sault Ste. Marie	2
Lake Erie	3	Sudbury	1
Lake Huron	1	Swastika	3
Lake Simcoe	2	White River	6
Parry Sound	1		

White-pine Weevil, *Pissodes strobi* (Peck)—Weevils thought to be this species have frequently been collected from coniferous hosts other than white pine. Cytological examination of adult weevils that had emerged from the leading shoots of white, Scots, and red pine and of black, white and Norway spruce, indicated no chromosomal differences. This tends to confirm the opinion that only one species is involved.

Chapleau	9	Lindsay	2
Cochrane	31	North Bay	14
Fort Frances	2	Parry Sound	12
Geraldton	5	Pembroke	13
Gogama	3	Port Arthur	1
Kapuskasing	23	Sault Ste. Marie	45
Kemptville	2	Sioux Lookout	7
Kenora	10	Sudbury	17
Lake Erie	2	Swastika	6
Lake Huron	3	Tweed	3
Lake Simcoe	9	White River	1

Smaller European Elm Bark Beetle, *Scolytus multistriatus* (Marsh.)—Surveys to follow changes in the distribution of this introduced beetle in Southern Ontario were continued in 1957. Collections, from Brantford Township and Smithville, showed that known range of distribution now extends into Brant and Lincoln counties. Of even greater import was the first record of its occurrence in Durham County, Lindsay District. This vector of the Dutch elm disease is now known to occur in all counties south of a line drawn from Sarnia to Hamilton and in Durham County.

Lake Erie	4	Lindsay	1
Lake Huron	2		

Walkingstick, *Diapheromera femorata* (Say)—Basswood, black cherry, trembling aspen, and red oak trees were stripped of foliage in a 100-acre section of the Vivian Forest, Lake Simcoe District, and pockets of heavy infestation recurred in Haldimand Township and in the Ganaraska Forest, Lindsay District. Light infestations occurred on Cape Croker Indian Reservation and at Colpoy's Bay in the northern part of Lake Huron District, and on mature basswood trees in the Uxbridge Forest, Lake Simcoe District. Only small numbers of walking-sticks were observed in the Grand Bend-Fort Franks area in Lake Erie District.

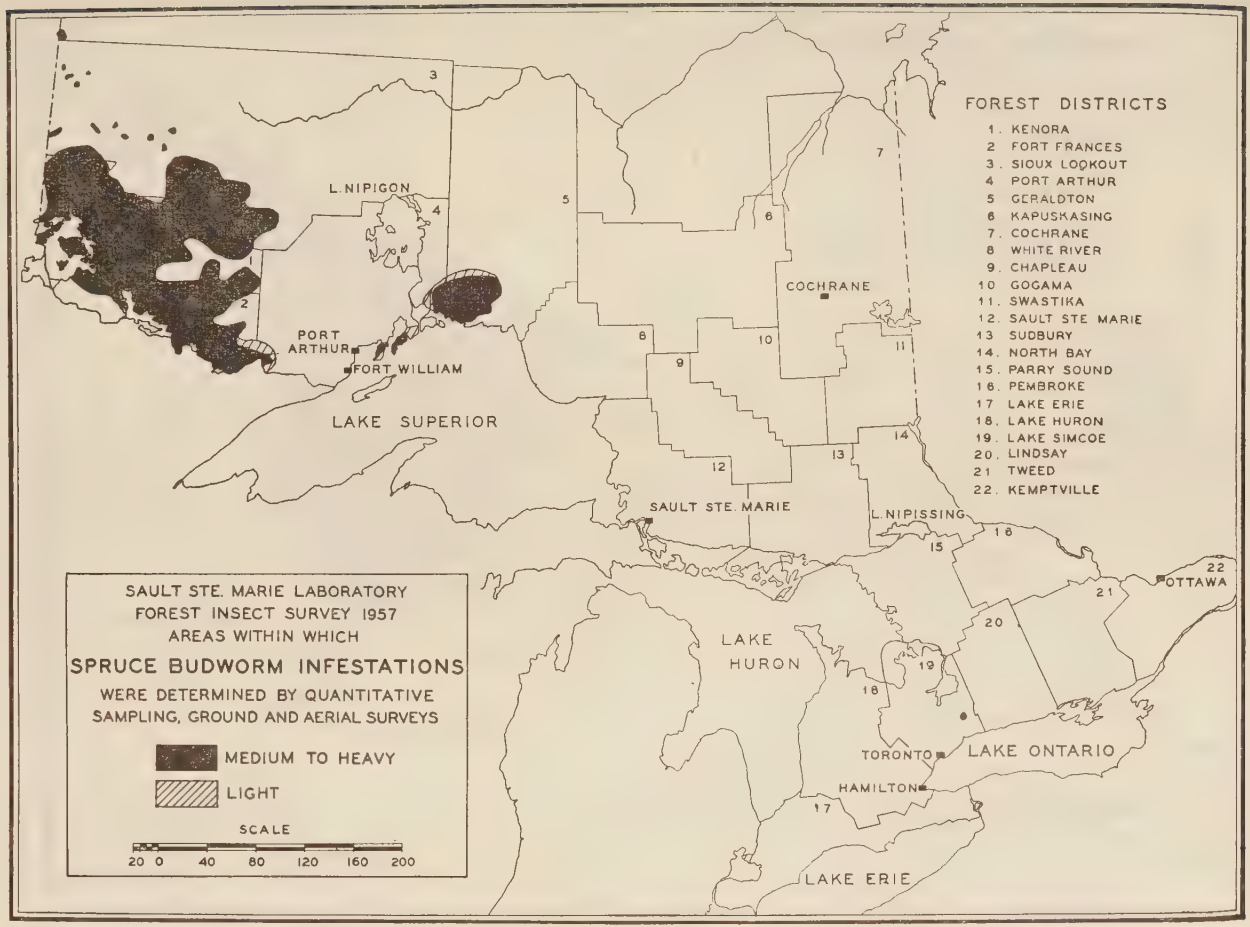
Lake Erie	8	Lindsay	1
Lake Huron	6	Tweed	1
Lake Simcoe	3		

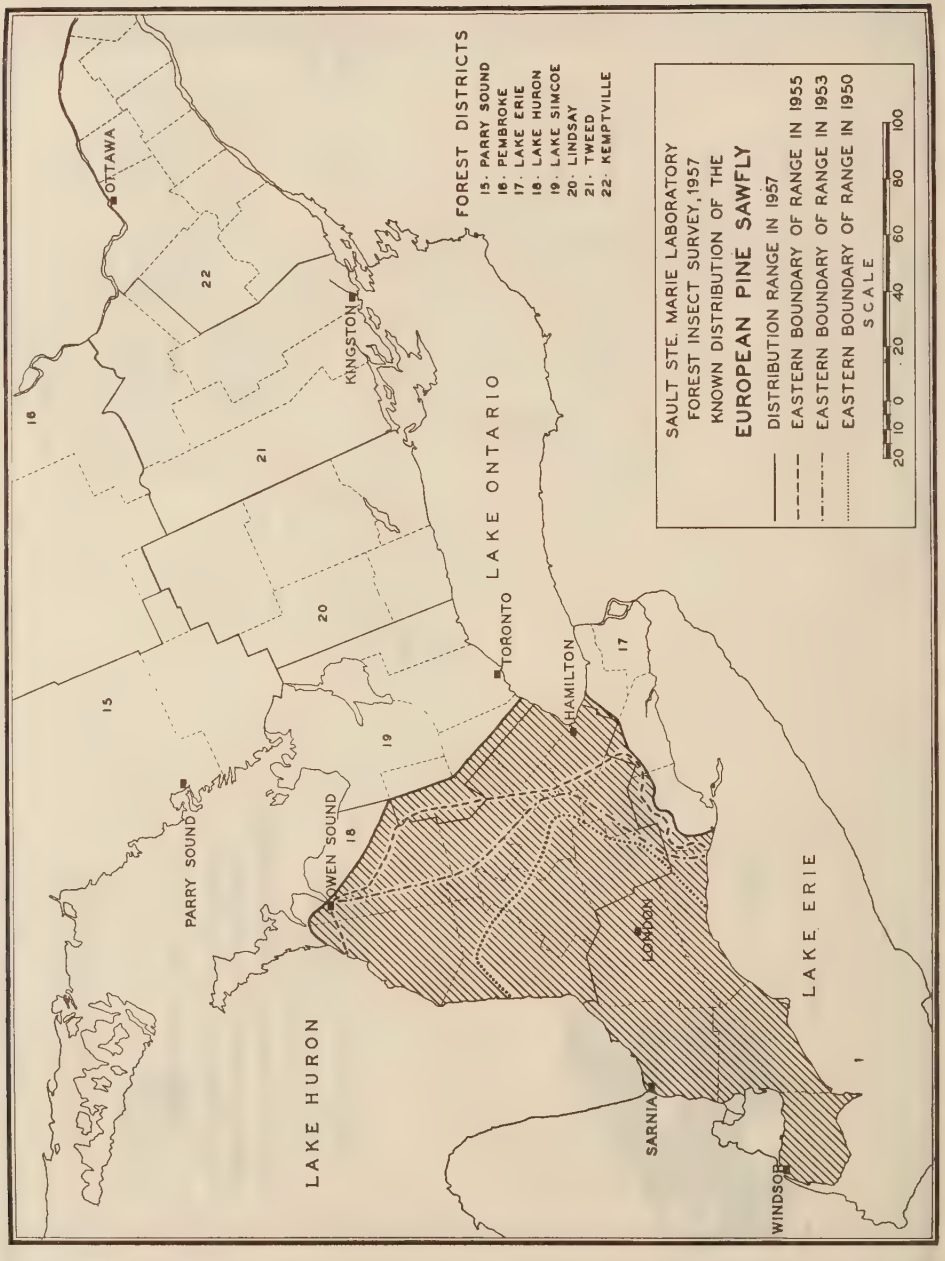
Balsam Gall Midge, Probably *Itonida balsamicola* (Lint.)—In recent years there has been a general increase in galls formed on the new needles of balsam fir by this midge. Infested needles turn brown and eventually break off at the base of the gall. Large populations occurred at numerous points in the Kenora, Port Arthur, Kapuskasing, Gogama, and North Bay districts in 1957.

Chapleau	1	North Bay	17
Cochrane	10	Pembroke	23
Geraldton	9	Parry Sound	4
Gogama	5	Port Arthur	3
Kapuskasing	5	Swastika	5
Kenora	3	Tweed	1

A Spider Mite, *Oligonychus* sp.—Large numbers of this mite were present on open-grown jack pine trees along the shores of Lake Nipissing and Temagami Lake in the North Bay District, on balsam fir regeneration along Highway 11 between North Bay and Latchford, and on coniferous trees on Bernice Island, Parry Sound District, where DDT was used in 1955 to control a severe infestation of the hemlock looper.

Cochrane	1	Pembroke	1
North Bay	4	Sault Ste. Marie	2
Parry Sound	1	Sioux Lookout	1


FOREST DISTRICTS
1. KENORA
2 FORT FRANCES
3. SIOUX LOOKOUT
4 PORT ARTHUR
5 GERALDTON
6 KAPUSKASING
7. COCHRANE
8 WHITE RIVER
9. CHAPLEAU
10 GOGAMA
11. SWASTIKA
12. SAULT STE MARIE
13 SUDBURY
14. NORTH BAY
15. PARRY SOUND
16. PEMBROKE
17 LAKE ERIE
18. LAKE HURON
19. LAKE SIMCOE
20. LINDSAY
21 TWEED
22. KEMPTVILLE
L. NIPIGON
PORT ARTHUR
FORT WILLIAM
LAKE SUPERIOR
COCHRANE
SAULT STE. MARIE
L. NIPISSING
OTTAWA
LAKE HURON
TORONTO
LAKE ONTARIO
HAMILTON
LAKE ERIE
SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY 1957
AREAS WITHIN WHICH
SPRUCE BUDWORM INFESTATIONS
WERE DETERMINED BY QUANTITATIVE
SAMPLING, GROUND AND AERIAL SURVEYS
MEDIUM TO HEAVY
LIGHT
SCALE
20 0 40 80 120 160 200


SAULT STE. MARIE LABORATORY
FOREST INSECT SURVEY, 1957
KNOWN DISTRIBUTION OF THE
EUROPEAN PINE SAWFLY
DISTRIBUTION RANGE IN 1957
EASTERN BOUNDARY OF RANGE IN 1955
EASTERN BOUNDARY OF RANGE IN 1953
EASTERN BOUNDARY OF RANGE IN 1950
SCALE
20 10 0 20 40 60 80 100
FOREST DISTRICTS
15. PARRY SOUND
16. PEMBROKE
17. LAKE ERIE
18. LAKE HURON
19. LAKE SIMCOE
20. LINDSAY
21. TWEED
22. KEMPTVILLE
OTTAWA
KINGSTON
TORONTO
HAMILTON
LONDON
SARNIA
WINDSOR
PARRY SOUND
OWEN SOUND
LAKE ONTARIO
LAKE ERIE
LAKE HURON
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PROVINCE OF ONTARIO

FOREST DISEASE SURVEY

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INTRODUCTION

During 1957, late May frosts and the prolonged drought period of midsummer caused extensive injury to the foliage of many hardwood species. Injury was particulary noticeable along the north shore of Lake Erie, and on the Niagara Peninsula.

Forest Biology rangers, Ontario Department of Lands and Forests personnel, and other co-operators were asked to stress collections illustrating the canker and dieback condition of balsam fir, the chlorosis of white pine needles, tip and twig blight of balsam poplar and trembling aspen, and needle rusts from black and white spruce.

The nature of these disease conditions resulted in mass collections frequently made over extensive areas. These are reported as single collections in the following list showing distribution of collections among the principal host trees.

Coniferous trees	Collections	Broad-leaved trees	Collections
Balsam fir	240	Elm	315
Pine	171	Maple	54
Spruce	69	Poplar	45
White cedar	12	Birch	19
Juniper	3	Oak	15
Colorado fir	2	Willow	13
Hemlock	2	Prunus	6
Yew	1	Alder	6
		Mountain ash	4
Total	500	Catalpa	3
		Apple	3
		Total	483

Miscellaneous hosts 24

Grand Total 1,007

Dutch Elm Disease—During 1957 *Ceratocystis ulmi* (Buism.) C. Moreau (*Ceratostomella ulmi* (Schwarz) Buism.), the causal organism of Dutch elm disease, was isolated from 157 of the 292 elm samples submitted for culturing. Four isolates of *Verticillium* sp. and one *Cephalosporium* sp. were also obtained.

The accompanying map shows the total number of samples from which the causal organism was isolated for each county since the presence of the disease was first recorded in Ontario in 1946.

In 1957 the organism was found in Brant and Ontario counties for the first time. Marked increases in the number of confirmed diseased samples were recorded for Durham, Halton, Lincoln, Middlesex, Oxford, Wentworth, and York counties.

It should be pointed out that the map records those samples from which the causal organism was isolated by Dr. R. Macrae, Botany and Plant Pathology Division, Ottawa, Ontario, for the years 1946-55, and at this laboratory for the years 1956-57. Also included are eight positive samples cultured and identified by Dr. D. L. Bailey, Professor of Plant Pathology, Botany Department, University of Toronto.

It has recently come to our attention that other agencies have independently reported additional infected trees. This, coupled with the absence of a systematic survey, means that the accompanying map shows only the minimum number of known diseased trees in Ontario.

Canker and Dieback of Balsam Fir—This condition was first reported in 1954. Since that time identification of the fungi found on dying balsam fir trees, and the probable relationship of these fungi with dieback has been established through investigations carried out co-operatively with Dr. F. L. Raymond.

Three fungi, *Thyronectria balsamea* (Cke. and Pk.) Seeler, *Dermea balsamea* (Pk.) Seav., and *Cytospora* sp. have been found associated with dying balsam fir trees throughout the Province. *T. balsamea* was found in 66 collections from 16 forest districts; *Micropera abietinum*, the imperfect stage of *D. balsamea*, was found in 58 collections from ten forest districts, and the *Cytospora* sp. was found in 32 collections from ten forest districts. *D. balsamea* was found in two collections from one forest district, and *Valsa* sp., probably the perfect stage of the *Cytospora* sp., in three collections from two forest districts.

This disease condition has been attributed by entomologists to the feeding of adult sawyer beetles and to woolly aphid attack, and by pathologists to several normally saprophytic fungi. The experiments of the past year, coupled with field observations, have led to the conclusion that the above mentioned fungi, and perhaps one additional organism, are capable of causing the disease condition, but only when insects attacks or mechanical injuries provide suitable infection courts.

Characteristic feeding scars of the sawyer beetle (*Monochamus* spp.), were found with typical dieback for some time before their cause was realized. Isolations from twigs whose death was associated with *Monochamus* feeding have, on different occasions, produced *Thyronectria*, *Micropera*, and *Cytospora*.

Artificial inoculation and reisolation carried on with *Thyronectria* have established its ability to kill tips and form cankers, while producing the characteristic reddening of the foliage. Similar experiments are under way with the two other organisms.

Shoestring Root Rot, *Armillaria mellea* (Vahl ex Fr.) Quél.—During 1957 collections of this fungus were obtained from white spruce, black spruce, red pine, jack pine, and balsam fir. Collections were made from plantations and from trees growing under forest conditions.

Needle Rusts of Pine and Spruce—During 1957, collections of *Coleosporium asterum* (Diet.) Syd. were secured from jack and red pine trees, in the Lake Simcoe, Parry Sound, Kemptville, and Lake Huron Districts. Although conspicuous in the spring, permanent effects of the disease have not been noticed.

Chrysomyxa ledicola Lagh. was obtained from black and white spruce from the Cochrane, Sioux Lookout, Chapleau, Port Arthur, and Gogama districts.

Chrysomyxa ledi de Bary was obtained from black and blue spruce from the Parry Sound, Port Arthur, Kenora, and Kapuskasing districts. Infection appears to have been particularly heavy in the Kenora and Port Arthur districts, with a very high incidence around Dog River in the Port Arthur District.

From reports reaching this laboratory, it would appear that the incidence of these needle rusts was generally much higher in Ontario in 1957 than in 1955 or 1956.

Ink Spot Disease of Poplar—*Ciborinia whetzelii* (Seav.) Seav. was reported from several areas. It reached a moderate to heavy incidence in some local areas such as McIrvine, Sifton, Richardson, and Dance townships in the Fort Frances District, Township 28 in the Sault Ste. Marie District, Best Township in the North Bay District, and in Summers Township in the Geraldton District.

Leaf and Twig Blight of Poplar—This condition on balsam poplar is caused by the ascomycete, *Didymosphaeria populina* Vuill. and its imperfect stage *Pollaccia elegans* Serv.; the imperfect fungus, *Fusicladium radiosum* (Lib.) Lind. causes the disease on trembling aspen.

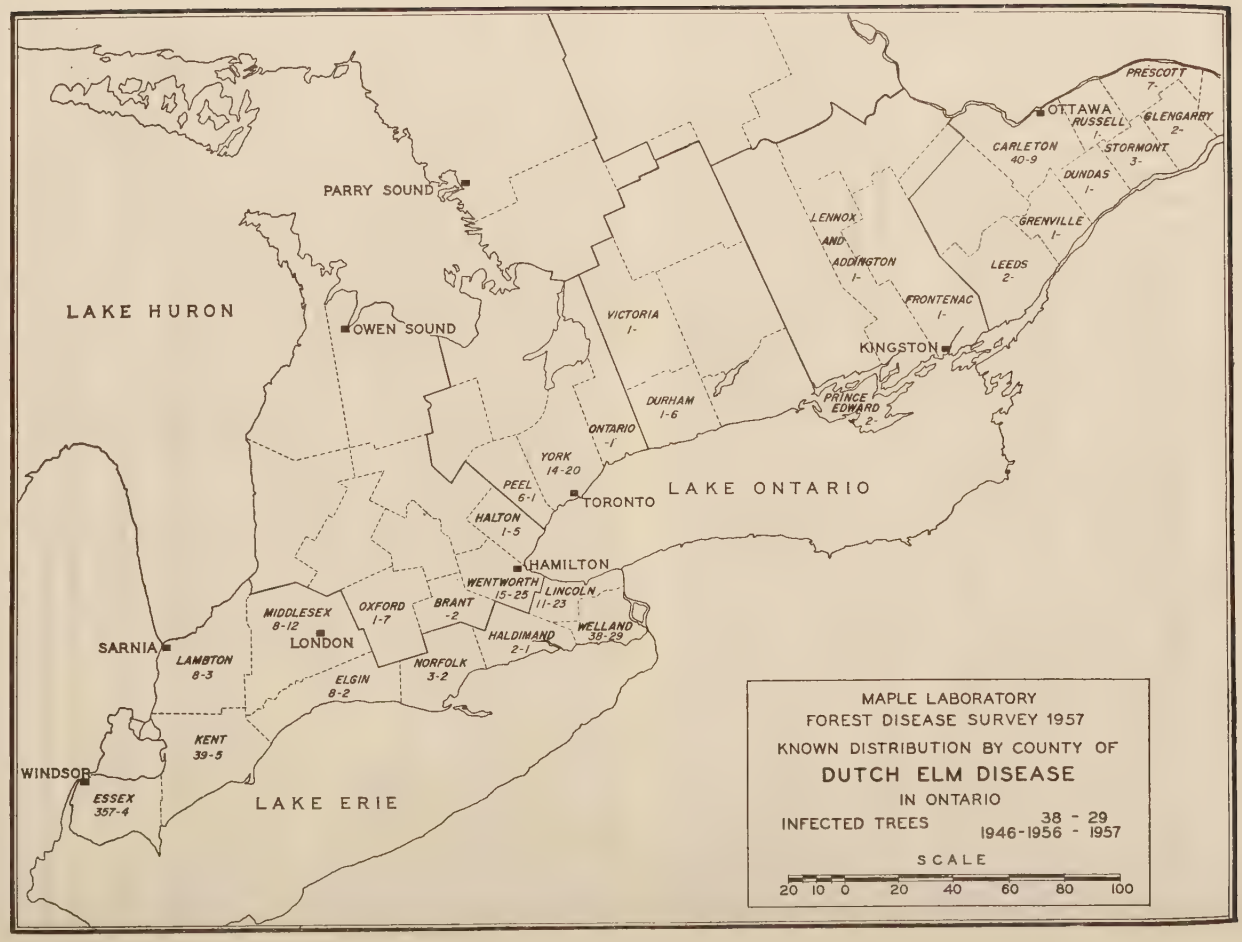
Infection of trembling aspen trees was heavy in Township 28 and Mack Township and of medium intensity in Long Township, Sault Ste. Marie District. In the Fort Frances District, trembling aspen was moderately affected in the Sifton, Calm Lake, Lac La Croix, French Lake, Carpenter, and Quetico Park areas. Balsam poplar was affected lightly in Fauquier Township in the Kapuskasing District.

Septobasidium pinicola Snell—This is the first time this organism has been reported by the Ontario Forest Disease Survey. It is of interest, not because of its pathogenic capabilities, but because of its relationship to scale insects. This fungus parasitizes scale insects found on white pine trees and depends on these insects for food. Occasionally fruiting bodies are found that lack any evidence of insects in the colony; it is inferred that fructifications probably began on scattered scale insects which have been completely overgrown and destroyed. In spite of the wide distribution of white pine in Ontario, this organism was collected only from Griffith, Stratton, Sproule, and Canisbay townships, in the Pembroke District.

Chlorosis of White Pine Needles—This condition, which is distinct from white pine needle blight, was apparent on white pine trees during the early summer, particularly in the North Bay, Parry Sound, and Sudbury districts. Numerous needle and twig collections were made, but the only organism found consistently was *Lophodermium pinastri* (Schrad. ex Fr.) Chev. Fruiting bodies were found not only on fallen needles, but also on chlorotic, apparently senescent needles still attached to the tree. Possibly this organism contributes to the condition but no satisfactory conclusions have been reached concerning its parasitic capabilities; it is impossible to clarify its role further without experimental work.

OTHER NOTEWORTHY DISEASES

Host	Causal Agent	Location	Remarks
Balsam fir....	*Rhizosphaera pini* (Cda.) Maubl.	General through the Parry Sound, Sudbury, and North Bay Districts.	First report for the Survey. Can cause browning and death of the needles.
Butternut....	*Melanconium oblongum* Berk.	Lake Erie District.....	First report for the Survey
White oak ..	*Coryneum kunzei* Corda..	Belmont Township, Lindsay District.....	First report for the Survey


LAKE HURON
PARRY SOUND
OWEN SOUND
VICTORIA
1-
DURHAM
1-6
ONTARIO
1
YORK
14-20
PEEL
6-1
TORONTO
LAKE ONTARIO
HALTON
1-5
HAMILTON
WENTWORTH
15-25
LINCOLN
11-23
BRANT
2
OXFORD
1-7
MIDDLESEX
8-12
LONDON
SARNIA
LAMBTON
8-3
ELGIN
8-2
NORFOLK
3-2
HALDIMAND
2-1
WELLAND
38-29
KENT
39-5
WINDSOR
ESSEX
357-4
LAKE ERIE
KINGSTON
PRINCE EDWARD
2
LENNOX
AND
ADDINGTON
1-
FRONTENAC
1-
LEEDS
2-
GRENVILLE
1-
DUNDAS
1-
CARLETON
40-9
OTTAWA
RUSSELL
1-
STORMONT
3-
GLENGARRY
2-
PRESCOTT
7-
MAPLE LABORATORY
FOREST DISEASE SURVEY 1957
KNOWN DISTRIBUTION BY COUNTY OF
DUTCH ELM DISEASE
IN ONTARIO
INFECTED TREES 38 - 29
1946-1956 - 1957
SCALE
20 10 0 20 40 60 80 100

PROVINCES OF MANITOBA AND SASKATCHEWAN

FOREST INSECT SURVEY

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INTRODUCTION

Three forest insects occurred in infestation proportions in Manitoba and Saskatchewan. The spruce budworm again caused severe defoliation of spruce and balsam fir in the Eastern District of Manitoba. Tree mortality was evident in some areas where high populations have persisted for three or four consecutive years. The old infestation at Namew Lake in the north continued and showed a considerable northwestward extension in Saskatchewan. There was a general increase in the extent and intensity of the jack-pine budworm infestation in the Sandilands Forest Reserve. Many of the older pine plantations in the Spruce Woods Forest Reserve were also heavily attacked by this species. Large aspen tortrix larvae caused complete defoliation of trembling aspen early in the season over an extensive area of the aspen grove region of both Manitoba and Saskatchewan.

Pine transplants in stand openings and areas bordering agricultural lands in the Agassiz Forest Reserve were heavily attacked by species of white grubs. Surveys indicated that grubs are present in very large numbers in many areas proposed for future planting in the Reserve, and threaten to disrupt the afforestation program.

Detection surveys were continued for a number of potentially destructive forest insects. The most significant result was the first collection of a native vector of Dutch elm disease, but the disease has never been recorded in this region.

The number of samples received at the laboratory totalled 3,052. Of these, 2,940 were submitted by Forest Biology personnel and 112 by provincial personnel and other co-operators. In addition to reporting on insect conditions, the Provincial forest services assisted by providing many valuable services essential to the operation of the Survey.

Many of the samples collected by Forest Biology rangers were more quantitative than in previous years. These samples will provide the basic data needed for developing specific and more reliable population sampling techniques for a number of major forest insects. The numbers of collections from the principal host trees were as follows:

Coniferious trees	Collections	Broad-leaved trees	Collections
White spruce	460	Trembling aspen	680
Jack pine	417	Willow	206
Tamarack	242	Manitoba maple	153
Black spruce	143	White birch	138
Balsam fir	90	Chokecherry	97
Lodgepole pine	20	Alder	80
Scots pine	6	Balsam poplar	78
Other coniferous trees	28	White elm	33
		Green ash	21
Total	1,406	Bur oak	14
		Other broad-leaved trees	34
		Total	1,534

Miscellaneous hosts 112
Grand Total 3,052

IMPORTANT INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)—Aerial defoliation surveys in northern and eastern Manitoba were extended and took about 36 hours flying time. Ground surveys and egg counts were continued in all accessible areas. Boundaries of the infestation changed only slightly over the past year. Details of survey methods and infestation boundaries were outlined in the 1956 Report.

In the Eastern District of Manitoba the main infestation was again centered in the Manigotagan and Wanipigow watersheds and extended from the Manitoba-Ontario border to the Saints Lakes area in the Interlake region. Smaller infestations also occurred on several islands in Lake Winnipeg, at several points along the Winnipeg River, and through the north end of the Whiteshell Forest Reserve. Defoliation of white spruce and balsam fir trees in most areas of the Eastern District generally was not as severe as in 1956. The only appreciable change in infestation boundaries was in the Saints Lakes area where the infestation extended north to Jackhead River. Two small pockets of severe defoliation were reported for the first time on the Bloodvein and Berens rivers, north of the 1956 infestation areas. The total area of moderate to severe defoliation in the Eastern District is about 540 square miles.

The large numbers of spruce budworm in the Spruce Woods Forest Reserve caused complete defoliation of current growth of white spruce trees. By late June, the crowns of most affected trees had developed a distinct reddish appearance. Moderate to severe defoliation continued in the Moose Lake-Harrison Creek area of southeastern Manitoba. The infestation in this area joins that of northern Minnesota and western Ontario.

Local infestations in shelterbelts and other isolated spruce stands in southern Manitoba and Saskatchewan generally subsided in 1957. However, some white and blue spruce plantations in the Indian Head nurseries were again heavily attacked. Small localized infestations were recorded on native white spruce along valley bottoms in the West Block of the Cypress Hills Provincial Forest. This is the first year that the budworm has been abundant in this area.

The spruce budworm was common throughout the Western District of Manitoba, but noticeable defoliation was restricted to open-grown white spruce trees north of Clear Lake and through the Duck Mountain Forest Reserve and Swan River areas.

The infestation at Namew Lake on the Manitoba-Saskatchewan border continued and showed a further extension northwest into Saskatchewan. On the Manitoba side the infestation has for the most part subsided. This can be attributed to recent salvage and presalvage operations which have removed most of the merchantable trees in the area. In Saskatchewan, the infestation covers an area of approximately 240 square miles, and extends to the east shore of Mariache Lake and north to Taylor and Leaf lakes.

Mortality plots were established in the Riverton and Biscuit Harbor areas of the Interlake region. The infestation history is similar to that of most of the Eastern District—four years of moderate to severe defoliation. Plot tallies and critical examination of the cambium of representative balsam fir trees showed about 1 per cent and 7 per cent mortality in the Riverton and Biscuit Harbor plots respectively. These figures by no means reflect the extent of budworm damage. Most of the balsam fir in these plots and adjacent areas have dead or dying tops and rapid deterioration of the stands can be expected if the infestation continues.

Egg mass sampling was carried out at selected points in 1956 and 1957 as an aid in forecasting the degree of defoliation that could be expected the following year. Sampling records and actual defoliation estimates for 1957 are shown in the following table.

Location	Infestation Ratings			Population Records	
	Infestation forecast for 1957	Actual defoliation in 1957	Infestation forecast 1958	Calculated no. of egg clusters per 100 sq. ft. of balsam fir foliage	
				1956	1957
Eaglenest Lake	severe	light	moderate	415	110
Garner Lake	severe	moderate	moderate	233	54
Bushy Lake	severe	light	light	75	0
Manigotagan Lake	severe	severe	moderate	831	65
Wanipigow Lake	severe	moderate	severe	206	176
Pine Dock	severe	severe	severe	852	298
Bird River	light	light	light	57	25
Dorothy Lake	nil	light	light	0	0
Winnipeg River	severe	moderate	severe	801	232
Falcon Lake	light	light	light	3	13
Sandilands F. R.	moderate	moderate	light	19	28
East Braintree	light	light	light	0	11
Moose Lake	moderate	moderate	moderate	82	55

As shown in the above table, the infestation forecasts for 1957 did not always agree with the actual defoliation. Light or moderate defoliation was recorded at some points having very high egg counts. This apparent decline in the infestation was further reflected in the egg counts for 1957 compared with those for 1956. The calculated number of egg clusters per 100 square feet of foliage for the two years is based on sequential samples of no fixed sample size and cannot be used for critical population appraisal. They do however reflect general trends. In all areas of high egg counts in 1956 there was a decline in egg numbers in 1957. The only increase in egg counts was in areas of low population in 1956. This indicates that older infestations are declining. Severe defoliation in 1958 is forecast for only three of the thirteen areas sampled.

The following table shows the occurrence of spruce budworm larvae in collections from spruce and balsam fir during the period of larval activity.

District	Collections from spruce and balsam fir	Percentage containing spruce budworm
Manitoba		
Southern	45	57.7
Eastern	80	82.5
Northern	61	40.9
Western	139	22.3
Saskatchewan		
Hudson Bay	67	5.7
Prince Albert	131	1.5
Meadow Lake	44	0.0
Northern	36	2.8
Southern	43	55.8
West-Central	54	5.6

	Collections
Manitoba	148
Saskatchewan	34

Jack-pine Budworm, *Choristoneura pinus* Free.—There was a further increase in the area and severity of jack-pine budworm infestations in southern Manitoba. An extensive infestation covered most of the Sandilands Forest Reserve south of the Trans Canada Highway. The degree of defoliation varied considerably and was heaviest in open stands producing heavy crops of staminate flowers. Larvae that dropped from the defoliated overstory caused severe defoliation and mortality of jack pine reproduction in some stands.

Pine plantations in the Spruce Woods Forest Reserve were again heavily attacked. Defoliation surveys have been conducted for the past two years in all

plantations where the budworm was found. The following classes were used for estimating defoliation:

Light.....loss of up to 25 per cent of current foliage
Moderate....loss of 26 to 75 per cent of current foliage
Heavy.....loss of more than 75 per cent of current foliage.

Defoliation records for infested plantations for the past two years are summarized in the following table:

Defoliation class	Species of pine	No. of plantations and total acreage			
		1956		1957	
Severe	Scots	3	61.0	5	68.7
	jack	2	2.3	1	9.0
	lodgepole	0	0.0	2	9.7
Moderate	Scots	4	45.3	11	107.1
	jack	3	33.3	5	50.4
	lodgepole	4	17.5	1	2.6
Light	Scots	13	81.1	4	10.5
	jack	24	226.7	21	213.3
	lodgepole	7	60.0	8	66.1

The above plantations were all established between 1905 and 1944. The budworm was found in younger plantations but defoliation was negligible. The most noticeable increase in defoliation in 1957 occurred in Scots pine plantings, and this tree species appeared to be the preferred host. It was common to see severely defoliated Scots pines adjacent to lightly defoliated jack and lodgepole pines. There also appears to be a more rapid deterioration of Scots pine following defoliation. Loss of the current foliage for two consecutive years has killed from 18 to 26 per cent of 27- to 32-year-old trees and caused serious top-killing of most of the remainder. High mortality was noted in lodgepole pine plantings, but most of this resulted from factors other than budworm, especially severe "winter drying" of foliage in 1955-56. No mortality of jack pine has been recorded to date. Very light populations of the jack-pine budworm occurred in natural stands of jack pine in the Western District of Manitoba and in the Prince Albert District of Saskatchewan.

The following table shows the occurrence of budworm larvae in collections from jack pine during the period of larval activity.

District	Collections from jack, lodgepole and Scots pine	Percentage of collections containing jack-pine budworm
Manitoba		
Southern	77	49.3
Eastern	102	63.7
Northern	32	0.0
Western	14	0.0
Saskatchewan		
Hudson Bay	30	13.3
Prince Albert	134	13.4
Meadow Lake	22	0.0
Northern	6	33.3
Southern	21	4.7
West-Central	4	0.0

	Collections
Manitoba	225
Saskatchewan	186

Larch Sawfly, *Pristiphora erichsonii* (Htg.)—The accompanying map shows the distribution and infestation ratings for field observations of the larch sawfly in tamarack stands in 1957. Most of the ratings are based on sequential sampling of egg numbers in permanent sample plots using infestation classes as defined in the 1956 Report. Ratings in inaccessible areas were based on aerial surveys.

The following table summarizes egg sampling records in permanent plots for 1956 and 1957. Although these records are based on unequal and frequently small samples they do serve to show population trends over large areas from one year to another.

Forest District	Number of sample plots	Average percentage of current shoots utilized for oviposition	
		1956	1957
Manitoba			
Southern	4	8.8	4.1
Eastern	8	9.2	3.0
Western	8	1.3	1.0
Northern	4	2.3	1.7
Saskatchewan			
Hudson Bay	4	.9	.8
Prince Albert	6	6.1	1.6
Northern	4	1.9	3.0
Meadow Lake	4	1.0	.8

There was a further general decline in the sawfly population in most districts. Increases were noted in some tamarack stands in the Whiteshell Forest Reserve and north of Riverton but these were offset by reductions in other parts of the Eastern District. Within the two provinces severe infestations were restricted to areas north of the Churchill River Basin in the Northern District of Saskatchewan.

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.)—Infestations of this insect are characterized by the rapid rise in populations, often over very extensive areas. Infestations seldom persist for more than two years.

In 1956 a number of small local infestations occurred in the Eastern and Western districts of Manitoba and in the Hudson Bay and Southern districts of Saskatchewan. As shown in the accompanying map, infestations in 1957 covered more than 10,000 square miles in the aspen grove region.

In Manitoba, trembling aspen trees through most of the Interlake region from Twp. 18 north to Twp. 25 were moderate to severely defoliated. This infestation extended into the Western District and in particular was heavy in parts of the Riding Mountain National Park. Aspen in the vicinity of Wasagaming townsite and recreational areas around Clear Lake were completely stripped of foliage by the latter part of June. Most of the trees refoliated, but the new foliage was sparse. Extensive infestations also occurred east of Dauphin in the Sheregrove area and through the southern portion of the Duck Mountain Forest Reserve.

In Saskatchewan, an infestation covered most of the southern part of the Hudson Bay District and extended in a northwest band through the aspen grove region to areas south of Prince Albert. In the Southern District, aspen was severely defoliated in the Ituna-Leross area and east through Moose Mountain National Park to the Manitoba boundary. Elsewhere the large aspen tortrix was common but not numerous enough to cause noticeable defoliation.

The following table shows the occurrence of aspen tortrix larvae in collections from trembling aspen during the period of larval activity:

District	Collections from trembling aspen	Percentage containing large aspen tortrix
Manitoba		
Southern	56	25.0
Eastern	47	48.9
Northern	38	8.2
Western	76	56.5
Saskatchewan		
Hudson Bay	118	46.1
Prince Albert	69	34.8
Meadow Lake	46	43.4
Northern	26	34.4
Southern	133	57.1
West-Central	76	69.7

	Collections
Manitoba	83
Saskatchewan	237

Boxelder Twig Borer, *Proteoteras willingana* (Kft.)—Sampling has been conducted during the past two years in farm shelterbelts and parklands of southern Manitoba and Saskatchewan, where this species has caused considerable damage to Manitoba maple. At representative points four branches were examined from each of three crown levels of five sample trees. The average percentage of infested twigs was used as a population index. The following table summarizes records for the past two years.

Forest District	1956		1957	
	Number of sample points	Average percentage of twigs infested	Number of sample points	Average percentage of twigs infested
Manitoba				
Southern	7	13.4	8	8.0
Saskatchewan				
Southern	9	24.3	7	14.5
West-Central	5	9.7	10	14.0
Meadow Lake	—	——	8	1.5

Numbers were generally lower in the Poplar Point and Portage la Prairie areas of southern Manitoba. Injury from past damage has caused noticeable pruning of twigs in some areas. The twig borer was found in all Manitoba maple shelterbelts examined in southern Saskatchewan. New terminal shoots were heavily infested near Rosthern, Maymont, and Phippen. The insect was found only on occasional trees in the Meadow Lake District.

Fall Cankerworm, *Alsophila pometaria* (Harr.)—Cankerworms in farm shelterbelts and townsites declined in some areas and increased in others in 1957. A marked decline was noted in the Portage la Prairie region but severe in station, were reported from the townsites of Virden, Arborg, Gimli, Winnipeg Beach Dauphin and Swan River, in Manitoba.

In Saskatchewan, infestations in farm shelterbelts subsided in the Moose Jaw area, but new infestations occurred in the Swift Current, Milden, Ardath and Vanscay areas. Most deciduous trees in Yorkton were completely defoliated.

Population counts were made at a number of points in the two provinces and were related to defoliation estimates at the end of the larval feeding period. The following table summarizes larval counts based on examination of 16 leaf clusters from each of three crown levels of five sample trees. Defoliation estimates are also included.

Location	Percentage of leaf clusters infested	Average number of larvae per infested leaf cluster	Defoliation at the end of larval feeding
Manitoba			
No. 1 Portage la Prairie	41.7	1.2	light
No. 2 Portage la Prairie	48.3	1.1	light
Bagot	15.4	1.3	light
Saskatchewan			
Moose Jaw	12.1	1.1	light
Val Jean	27.5	1.4	moderate
Vanscay	92.1	3.1	heavy
Floral	16.1	1.0	light

Defoliation at Portage la Prairie was somewhat lighter than would be expected and may possibly have resulted from the abundance of aphids. The heavy coating of honeydew seemed to interfere with the feeding of cankerworm larvae.

White Grubs, *Phyllophaga* spp., *Serica intermixta* Blatch.—The Manitoba Forest Service started an afforestation program in the Agassiz Forest Reserve in 1956 to develop a 5,000-acre forest of various pines spread over areas bordering agricultural lands and stand openings. The soil in proposed planting areas is sandy and frequently covered with a heavy sod layer.

Out of 400 acres planted with jack, Scots, and red pine seedlings in 1956, about 80 per cent had died by mid-summer of 1957. Examination of the root systems of dead plants showed heavy feeding by white grubs; up to ten grubs per cubic foot of soil were found in some areas. To date, four species have been collected from this area and positively identified. *Phyllophaga drakei* Kby., *Phyllophaga nitida* (Lec.), and *Serica intermixta* Blatch. were the principal species. *Diplotaxis tristis* Kby. was found only occasionally.

Surveys conducted in 25 proposed planting areas showed that nine areas had very large numbers of *Phyllophaga* and *Serica* spp. *Phyllophaga drakei* and *Phyllophaga nitida* are thought to have a four-year life cycle in Manitoba. Most of the damage occurs during the second and third year larval stages and over 60 per cent of the *Phyllophaga* species recovered in 1957 were in either the late pupal or adult stage. This indicates that 1958 will be a major flight year for these species; the planting program in the Agassiz Forest Reserve should include chemical or cultural control practices.

Yellow-headed Spruce Sawfly, *Pikonema alaskensis* (Roh.)—The status of this species showed little change except in northern areas, where numbers tended to increase slightly over 1956. Open-grown white spruce trees in Riding Mountain National Park were moderately defoliated and ornamental plantings in the Onanole, Russell, Elphinstone, and Fork River areas were heavily infested. Few sawfly larvae were found in southern Saskatchewan other than in the Kenosee Lake area and shelterbelts at Radisson, Wilkie, and Pilger, where moderate to severe defoliation occurred. Many unsprayed plantings in the Meadow Lake District again suffered heavy attack and the number of larvae increased in native stands in the Bronson Provincial Forest.

The infestation on spruce at Montreal Lake continued; many trees now show thin or bare crowns. Islands in Wollaston Lake were again heavily infested. The sawfly was found on black spruce trees in this area, and up to 90 per cent tree mortality is reported on islands where heavy defoliation has occurred for three or four consecutive years.

	Collections
Manitoba	
Southern	3
Eastern	3
Northern	6
Western	48
Saskatchewan	
Hudson Bay	11
Prince Albert	11
Meadow Lake	17
Northern	2
Southern	7
West-Central	37

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—Collections of forest tent caterpillars were received from all forest districts other than the Northern District of Manitoba. Although numbers were generally low, infestations may again be developing in some districts.

Moderate to severe defoliation of trembling aspen trees occurred in the Cypress Hills Provincial Forest. Egg surveys were conducted in the fall and up to 35 egg bands per tree were recorded indicating severe defoliation for 1958.

Larvae were found throughout the large aspen tortrix infestation area in the Hudson Bay District of Saskatchewan. Egg surveys were conducted at representative points in this District; counts indicate that the population level is still low.

	Collections
Manitoba	
Southern	1
Eastern	4
Western	3
Saskatchewan	
Hudson Bay	11
Prince Albert	11
Meadow Lake	2
Southern	48
West-Central	4

Pine Root Collar Weevil, *Hylobius radicis* Buch.—Mortality of Scots and lodgepole pines 9 to 18 years old continued in heavily infested plantations in the Sandilands Forest Reserve. The weevil was collected from a large Scots pine planting previously uninfested in the southern part of the Reserve. Some plantations have been considered a complete loss and are being cut out. Mortality figures, based on counts in the fall of 1957, are summarized below.

Number of plantations	Area in acres	Species of pine	Percent mortality
5	85.5	Scots	17
1	.6	lodgepole	50
1	14.7	Scots lodgepole	29 18
1	22.1	Scots red	20 0
2	10.7	Scots lodgepole red	15 18 0

White-pine Weevil, *Pissodes strobi* (Peck)—Up to 50 per cent of the leaders of young jack pine trees were attacked by this weevil in the Flotten Lakes area of the Meadow Lake District. Planted white spruce at Green Lake and Paradise Hill were also infested. In the Prince Albert and Northern districts light attacks were reported on black spruce, white spruce, and jack pine.

Grey Willow-leaf Beetle, *Galerucella decora* (Say)—A severe infestation again occurred through much of southwestern Manitoba. Willows from Carberry west to Brandon and south to the Turtle Mountain Forest Reserve, were completely defoliated. Somewhat smaller infestations were reported from the Hilbre and St. Martin's area in the Interlake region, and through Riding Mountain National Park and the Dauphin area in the Western District. In the latter area, adult beetles caused severe defoliation of black poplar trees.

Numbers declined through most of southern Saskatchewan, but severe infestations again broke out through the Cypress Hills, Fort a la Corne, and Bronson Provincial forests.

Aphids, *Periphyllus negundinis* (Thos.) and *Eriosoma americanum* (Rly.)—Unusually high numbers of both the boxelder aphid and the woolly elm aphid occurred near Portage la Prairie, Carberry, and Brandon in Manitoba. Foliage of both trees were covered with honeydew and showed characteristic curling and wilting.

Many reports of infestations of the boxelder aphid were received from southern Saskatchewan. Populations were extremely heavy in the Moose Jaw and Birsay areas; coccinellid predators were common.

Pine Tortoise Scale, *Toumeyella numismaticum* (P. & M.)—This scale was found on jack pine regeneration in the Sandilands Forest Reserve and in the Stead and Belair areas in southeastern Manitoba, but damage was generally light. The infestations in the Home, Red Rock and Steep Creek blocks of the Prince Albert District in Saskatchewan declined further.

	Collections
Manitoba	
Southern	7
Eastern	16
Northern	2
Western	2
Saskatchewan	
Hudson Bay	10
Prince Albert	6
Meadow Lake	1

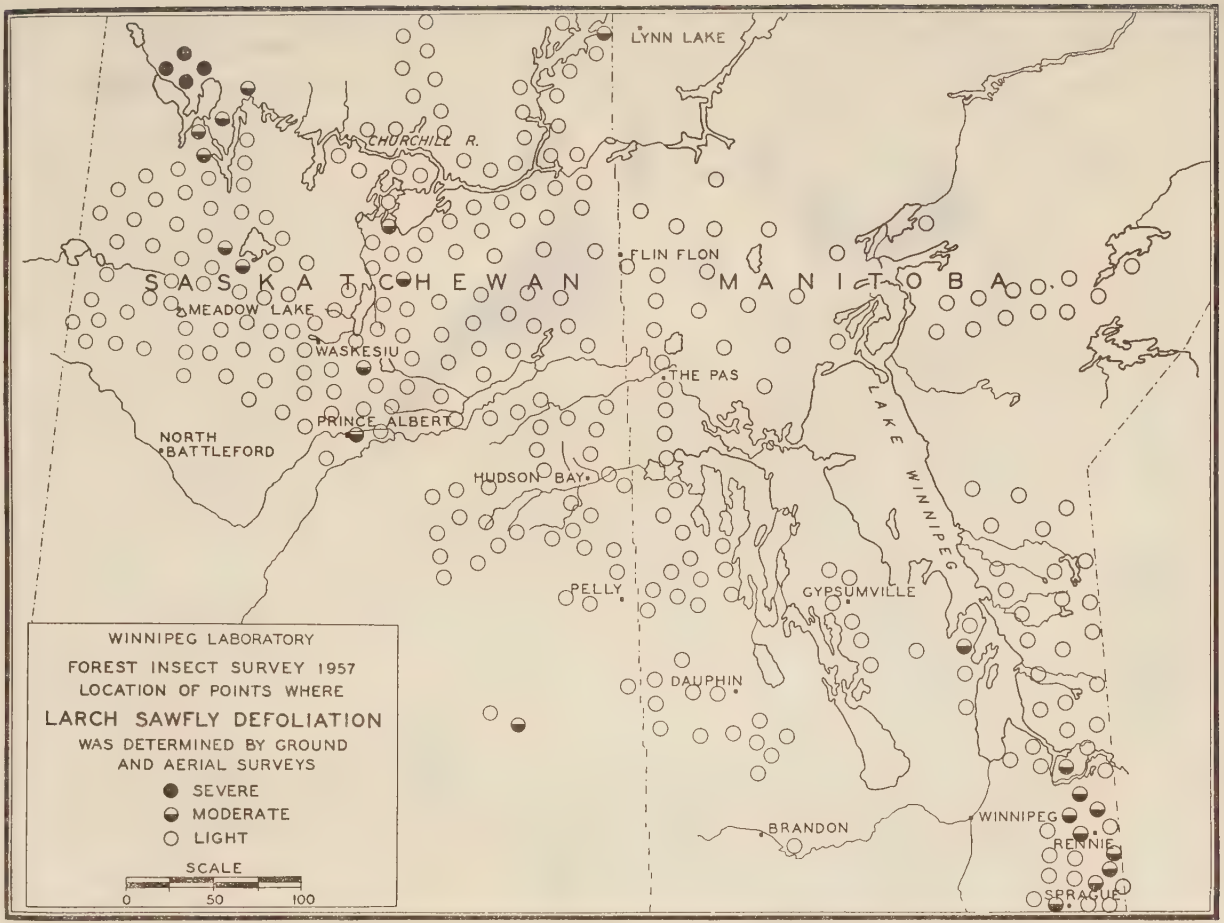
European Fruit Lecanium, *Lecanium corni* Bouché—Planted elms along bouvelards and in parks in Regina were heavily infested with this scale and appeared unsightly. Foliage was thin and a black fungus on the honeydew coated the twigs and branches.. Large numbers of aphids were also present.

Pine Sawflies, *Neodiprion* spp.—Over the past two years there has been a gradual increase in the distribution and abundance of sawflies found on jack pine trees in northern Manitoba and Saskatchewan. In 1957, an infestation covered approximately 40 acres of young jack pines in the Freshford area in northern Manitoba. Three species have been collected from this area and tentatively identified from the larval form as *Neodiprion virginianus*, *N. nanulus*, and *N. maurus*.

In the Nisbet Provincial Forest of the Prince Albert District, Saskatchewan, *N. virginianus* destroyed up to 90 per cent of old foliage.

Native Elm Bark Beetle, *Hylurgopinus rufipes* (Eich.)—Two collections of beetles from white elms at St. Norbert in southern Manitoba have been positively identified as the native elm bark beetle. This is the first known record for Manitoba. Trap logs will be laid out in other districts of Manitoba and Saskatchewan to obtain additional information on distribution. This bark beetle is one of the known vectors of Dutch elm disease.

Pitch Midges, *Retinodiplosis* spp.—Two species of midges were common in the Stead area of Manitoba. One is tentatively identified as *Retinodiplosis resinicola* (Osten Sacken); the other is not determined. Observations at Stead showed that the infestations in jack pine stands increased in area in 1957. Counts indicated a twofold increase in the numbers of current shoots infested. Small numbers of pitch masses inhabited by midges were found in other forest districts.


LYNN LAKE
CHURCHILL R.
FLIN FLON
SASKATCHEWAN
MANITOBA
MEADOW LAKE
WASKESIU
THE PAS
PRINCE ALBERT
NORTH BATTLEFORD
HUDSON BAY
LAKE WINNIPEG
PELLY
GYPSUMVILLE
DAUPHIN
BRANDON
WINNIPEG
RENNIE
SPRAGUE
WINNIPEG LABORATORY
FOREST INSECT SURVEY 1957
LOCATION OF POINTS WHERE
LARCH SAWFLY DEFOLIATION
WAS DETERMINED BY GROUND
AND AERIAL SURVEYS
SEVERE
MODERATE
LIGHT
SCALE
0
50
100

LYNN LAKE
CHURCHILL R.
FLIN FLON
SASKATCHEWAN
MANITOBA
MEADOW LAKE
WASKESIU
THE PAS
PRINCE ALBERT
NORTH BATTLEFORD
HUDSON BAY
LAKE WINNIPEG
PELLY
GYPSUMVILLE
DAUPHIN
BRANDON
WINNIPEG
RENNIE
SPRAGUE
WINNIPEG LABORATORY
FOREST INSECT SURVEY 1957
AREAS WITHIN WHICH DEFOLIATION BY THE
LARGE ASPEN TORTRIX
WAS DETERMINED BY GROUND AND AERIAL SURVEYS
MODERATE TO SEVERE
SCALE
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PROVINCE OF ALBERTA

FOREST INSECT SURVEY

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INTRODUCTION

Poplar defoliators caused the most conspicuous damage in the Alberta region in 1957. The larch sawfly again seriously defoliated larch trees in the northern half of the Province and sawflies heavily damaged spruce plantings in agricultural areas. In the Northwest Territories the spruce budworm infestation along the Mackenzie River remained much the same in size and intensity; this infestation was surveyed from the air in 1957. Surveys by boat were confined to the Athabasca, Peace, and Slave rivers with emphasis on Wood Buffalo Park. An aerial survey of the area around Fort Smith was made in a Forest Service helicopter. Provincial and federal government agencies and forest industries co-operated in making collections and assisting the Forest Biology rangers.

The 2,170 collections received in 1957 were taken from the following tree hosts.

Coniferous trees	Collections	Broad-leaved trees	Collections
Spruce	536	Trembling aspen	526
Pine	224	Willow	162
Larch	145	Poplar	146
Fir	56	Birch	86
Douglas fir	21	Manitoba maple	61
Juniper	7	Alder	49
		Elm	21
Total	989	Ash	9
		Total	1,060

Miscellaneous hosts	121
Grand Total	2,170

IMPORTANT INSECTS

Larch Sawfly, *Pristiphora erichsonii* (Htg.)—Severe damage by the larch sawfly extended in a narrow band from Millet north through Barrhead to Smith. North of Flatbush the band of severe infestation extended eastward through Calling Lake to the west side of Lac La Biche. From there the infestation extended northward into an inaccessible area. Along the Northern Alberta Railroad to the east, defoliation was moderate to heavy as far north as Waterways. Moderate injury extended west from the southern part of the heavily infested zone to Stony Plain and Drayton Valley. Elsewhere in the Province injury to larch stands was light.

In the fall of 1957 shoot sampling was carried out by the sequential method developed by Prentice and Ives of the Winnipeg Laboratory. The results are given in the following table.

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Location	Infestation class	Location	Infestation class
High Level	light	Barrhead	moderate
Kegg River	"	Obed	nil
Grimshaw	nil	Gainsford	moderate
Watino	light	Edmonton	severe
Grovard	nil	Peers Turnoff	nil
Slave Lake	light	Muskegg Entrance	"
Calling Lake	"	Miette	"
Grande Prairie	"	Mercoal	"
Lac La Biche	moderate	Millet	severe
Flatbush	"	Winfield	light
Cold Lake	light	Nordegg	"
Iosegun Lake	"	Rocky Mtn. House	"
Perryvale	moderate	Clearwater	"
Whitecourt	"	Caroline	"
Spedden	"		

Spruce Budworm, *Choristoneura fumiferana* (Clem.)—An aerial survey of the spruce budworm outbreak along the Mackenzie River was made in July, 1957, however, faulty aircraft and dense smoke made it impossible to map the full extent of the outbreak. But it was possible to determine that the infested area along the Mackenzie River remained much the same as reported for the past two years; the intensity of the infestation changed little from 1956. The number of pupae present at the time of observation indicated that the infestation is likely to continue unabated in 1958.

The infestation on the Slave River 100 miles north of Fort Smith, which was reported last year, increased in size in 1957 and extends for 14 miles along the River; defoliation was moderate. A light infestation was found at the junction of the Jackfish and Peace Rivers. Larvae of the spruce budworm caused light injury to spruce in the Cypress Hills. Injury from the two-year cycle spruce budworm in the National Parks was light.

Pine Needle Scale, *Phenacaspis pinifoliae* (Fitch)—Few infestations of this insect were reported from shelterbelt or shade trees in 1956. Along the Adanac Mine Road south of Blairmore, however, damage caused to lodgepole pine trees in 1955 and 1956 was evident in the short needle and twig growth produced in 1957. The number of scale insects present in 1957 was small.

The infestation reported in 1956 along the York Creek Road south of Coleman enlarged considerably this year. Although the exact boundaries are not determined, it is known to cover an area of many acres. Large numbers of the twice-stabbed lady beetle, *Chilocorus stigma* (Say), were observed feeding on scales.

Light infestations were found on lodgepole pine trees at Island Lake and three-quarters of a mile south of Elkwater townsite in the Cypress Hills. A small infestation was reported on Douglas fir five miles south of Burmis.

Spruce Spider Mite, *Oligonychus ununguis* (Jac.)—Low temperatures and heavy rains during July and August greatly reduced the number of spruce spider mites. In Banff townsite, the mite population increased sharply in early summer but by late August few mites could be found and injury was not serious. Moderate damage was reported from Wabamun, Taber, Brooks, Claresholm, and Medicine Hat. Serious injury resulted to a 15-year-old spruce plantation near Wetaskiwin. Moderate to heavy infestation occurred on a few trees and hedges in Jasper townsite.

Lodgepole Needle Miner, *Recurvaria starki* Free.—The largest numbers, of this needle miner were found at the 5,400 foot level on Mount Eisenhower, 22 miles west of Banff. Defoliation was less than 20 per cent.

A Root Weevil, *Hylobius warreni* Wood.—The recorded distribution of this weevil now extends south to the Elbow Ranger Station and its presence in the Cypress Hills was confirmed in 1957. In the Cypress Hills, 34 of 38 trees examined had been attacked. The intensity of infestation elsewhere in the Province remained much the same as in 1956.

Neodiprion Sawflies, *Neodiprion* spp.—There was a considerable increase in the number of *Neodiprion* sawflies on spruce shelterbelts in the Wetaskiwin-Drumheller district in 1957. These insects have been rather scarce since 1951 when a virus disease greatly reduced their numbers. Defoliation was difficult to assess since it was often associated with yellow-headed spruce sawfly damage. Moderate damage to pine occurred near Barrhead and Sunnybrook.

Yellow-headed Spruce Sawfly, *Pikenoma alaskensis* (Roh.)—Damage by the yellow-headed spruce sawfly increased in 1957. Large numbers were present wherever spruce was found in shelterbelts. Severe damage was reported from Drumheller north to Clyde Corner and from Entwhistle east to Mundare. Defoliation was heavy in Edmonton and Jasper Place where hundreds of trees have been completely defoliated. Smaller pockets of infestation occurred near St. Paul, Lloydminster, Provost, Bowness, and Langdon Corner. Light injury to ornamental spruce was reported from Waterton National Park and moderate to heavy infestations were found on ornamental spruce trees in Elk Island National Park.

Open-grown spruce trees along the north side of the North Saskatchewan River near Stony Plain were attacked heavily. The infestation one mile south-east of the Gap Ranger Station in the Livingstone Forest Reserve was greatly reduced by a hail storm last year but recovered and severe defoliation occurred again in 1957.

Engelmann Spruce Beetle, *Dendroctonus engelmanni* Hopk.—A strip cruise of a timber lease on the west Branch of the Castle River showed that 23 per cent (8.37 million FBM.) of the volume of Englemann spruce trees has been killed by Engelmann spruce beetles and root rot. This infestation has persisted for many years. It was estimated that 3.5 per cent had been infested in the past three years. The loss has made necessary a change in the original cutting recommendations from a 24-inch diameter limit to clear cutting.

Black-headed Budworm, *Acleris variana* (Fern.)—This insect caused little damage in 1957. Light infestations were reported in the National Parks and in stands south of the Bow River.

A Needle Miner, *Recurvaria canusella* Free.—Larvae of this insect were reported mining needles of jack pine near Duffield and Seba Beach. The same species was found mining black spruce needles near Chip Lake and Winterburn.

Defoliation of Aspen—A combination of severe winter injury and three defoliators was responsible for damage to many of the aspen stands in the southern half of the Province. The defoliators were the Bruce spanworm, *Operophtera bruceata* (Hulst), the large aspen tortrix, *Choristoneura conflictana* (Wlk.), and a leaf roller, *Compsolechia niveopulvella* Cham. Examination of aspen trees which failed to leaf out in the spring revealed that abnormal weather conditions had killed most of the buds. Killing of buds also occurred on hybrid poplars in shelterbelts and on native willows. Most of the damaged trees were found along the edge of the aspen zone between Innisfail and Waterton Lakes National Park. Leaves from adventitious buds appeared on most of these trees about a month later than normal.

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The Bruce spanworm was the most numerous of the three insects and was responsible for most of the damage along the eastern slopes; in the park belt area the large aspen tortrix was often equally abundant. *C. niveopulvella* was present throughout the area but in smaller numbers than the other species. The forest tent caterpillar, *Malacosoma disstria* Hbn., was associated with these three species in the Two Hills-Elk Point-Vermilion area.

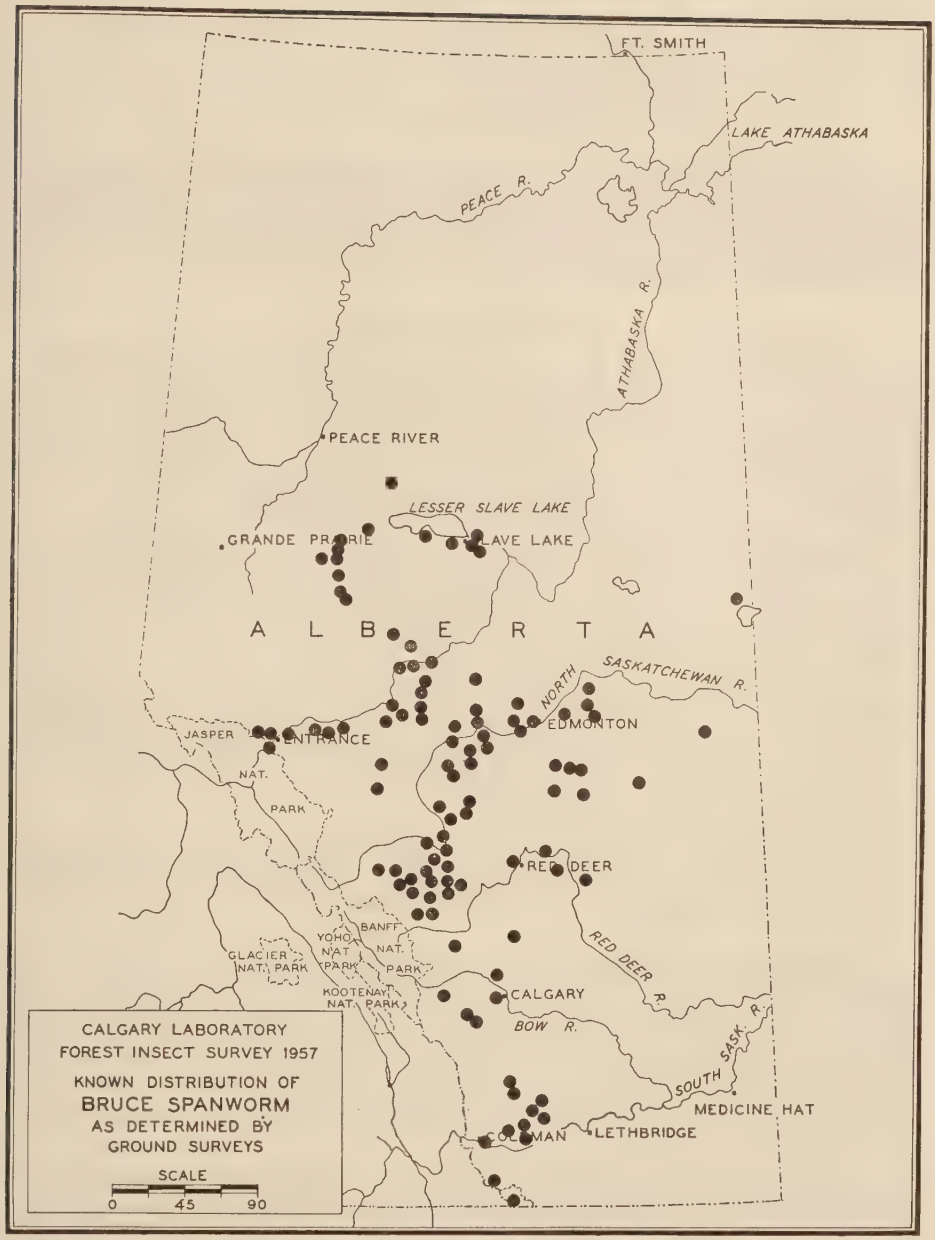
Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—The last outbreak of the forest tent caterpillar in Alberta subsided in 1953. Since that time this insect has not been reported except for an infestation at Mile 103 on the Mackenzie Highway. In 1956 tent caterpillars were reported feeding on the shelterbelt and riverbank trees in the Lethbridge area. In 1957, larvae appeared in small to medium numbers over a 10,000 square mile area in east-central Alberta, and in large numbers on shelterbelt and ornamental plantings near Lethbridge. The forest tent caterpillar was also reported from widely separated points in the northern half of the Province and from the Cypress Hills. A preliminary egg survey in the fall of 1957 indicated that complete defoliation will occur in parts of east-central Alberta in 1958.

Fall Cankerworm, *Alsophila pometaria* (Harr.)—The fall cankerworm continued to be a serious pest of shelterbelts in the Medicine Hat, Taber, and Lethbridge agricultural districts. Moderate infestation occurred in an area bounded by Vauxhall, Coaldale and Milk River, and at Claresholm. Heavy infestations were found between Taber and Whitla and at Foremost, Etzikom, and Scandia.

Spiny Elm Caterpillar, *Nymphalis antiopa* L. Colonies of the spiny elm caterpillar feeding on willow, elm, balsam poplar, and Saskatoon were reported from most districts in the southwestern part of the Province. Although defoliation was not important, the increase in numbers was considerable.

Tent Caterpillars, *Malacosoma pluviale* (Dyar) and *Malacosoma lutescens* (N. & D.)—Tents of these species were common south of the Bow River and were most numerous in the Medicine Hat, Brooks, and Taber agricultural districts.

Leaf Eating Beetles, *Phytodecta americana* (Schffr.) and *Galerucella decora* (Say)—Larvae of the American poplar beetle, *P. americana*, caused local patches of defoliation throughout most of the area where aspen grows in Alberta. Small areas were severely defoliated near Lundbreck and Cochrane. Adults and larvae of the grey willow beetle, *G. decora*, were common in the agricultural districts north of the North Saskatchewan River and east of Edmonton.


FT. SMITH
LAKE ATHABASKA
PEACE R.
ATHABASKA R.
PEACE RIVER
LESSER SLAVE LAKE
GRANDE PRAIRIE
SLAVE LAKE
A L B E R T A
NORTH SASKATCHEWAN R.
EDMONTON
JASPER NAT. PARK
ENTRANCE
RED DEER
BANFF NAT. PARK
YOHO NAT. PARK
GLACIER NAT. PARK
KOOTENAY NAT. PARK
RED DEER R.
CALGARY
BOW R.
SOUTH SASK. R.
MEDICINE HAT
COLEMAN
LETHBRIDGE
CALGARY LABORATORY
FOREST INSECT SURVEY 1957
KNOWN DISTRIBUTION OF
BRUCE SPANWORM
AS DETERMINED BY
GROUND SURVEYS
SCALE
0 45 90

PROVINCE OF ALBERTA

FOREST DISEASE SURVEY

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INTRODUCTION

A total of 1,111 additions consisting of 53 specimens and 1,058 cultures were processed in 1957. Of the cultures, 896 have been identified, 29 have been discarded as unidentifiable, and 133 have yet to be determined. Members of the Mycology Unit, Botany and Plant Pathology Division, Ottawa, assisted with the identification of many of the fungi.

IMPORTANT DISEASES

Armillaria Root Rot.—This disease caused by *Armillaria mellea* (Vahl ex Fr.) Quél., was reported in pine regeneration in the Robb area in 1954. In the 1957 field season, *A. mellea* was found in a young stand of Douglas fir in Waterton National Park and in a mixed lodgepole pine—alpine fir stand along Healy Creek in Banff National Park. In the Banff area 20 dead trees were examined with an average d.b.h of 3 inches and an average height of 15 feet. All the trees exhibited the characteristic symptoms caused by this disease.

Clumping of Aspen—A condition described as "unexplained clumping of aspen" described in the 1953 and 1954 Reports, was prevalent again in many trembling aspen stands in 1957. Particularly severe clumping was noted in the areas of Midnapore and Nanton, southwest of Calgary, and in the Innisfail, Didsbury, and Caroline districts southwest of Red Deer.

Culturing again failed to provide evidence of fungus infection. It is thought that severe unseasonal frosts together with chinook conditions may have been responsible for the dieback of the shoots and premature sloughing of the larger twigs. The conditions appeared to be aggravated this year by the presence of defoliating insects; in many areas defoliated trees recovered near the end of June after the insects stopped feeding.

Dwarf Mistletoe of Pine—This parasite (*Arceuthobium americanum* Nutt. ex Engelm.) of lodgepole pine was reported in a pine stand in the Caroline district. A preliminary survey indicated that more than 80 per cent of the trees in the stand were affected.

Needle Cast of Lodgepole Pine—This disease, caused by *Hypodermella montivaga* (Petrak) Dearn., broke out in parts of Banff and Jasper National parks in 1954 and 1955, but 1956 and 1957 foliage has escaped attack in most of the areas. One epidemic was reported, however, in Astoria Valley south of Jasper townsite, where 20 per cent of the crowns of 80 per cent of the trees showed symptoms and signs of this disease. Another outbreak was located in the Dutch Creek area in the Coleman district; a preliminary sampling revealed the disease to be present on 75 per cent of the trees.

Unexplained Poor Condition of Pine—An unusual condition in a 58-year-old stand of lodgepole pine was reported from the Whitecourt district. An inspection of the stand indicated foliage discoloration and poor leader growth over approximately 70 acres. Resinosis, associated with branch and stem cankers, was evident on 70.8 per cent of the trees examined.

A high incidence of *Atropellis piniphila* (Weir) Lohm. and Cash. prevailed, but it is not likely that these relatively young infections were primarily responsible for the condition of the stand.

Winter Injury of Pine—Exposure is one of the most important factors predisposing lodgepole pine stands to winter injury or red belting; this type of injury may be expected to recur in the same areas. During the 1957 field season some of the areas of red belt injury in previous years were re-examined. In all areas, the degree of red belting was less severe in 1957.

Decay in Aspen and Black Poplar—In 1957, studies were initiated in the Lesser Slave Lake area in co-operation with the Alberta Department of Lands and Forests to secure decay-age-site relationships for aspen and black poplar. During 1957, 463 trees were examined and 827 samples of the rots were collected for cultural identification of the decay organisms. The fungi tentatively identified to date include:

Armillaria mellea (Vahl ex Fr.) Quél.
Corticium polygonium Pers.
Fomes igniarius var. *populinus* (Neuman) Campbell
Pholiota squarrosa Quél.
Radulum casearium (Morgan) Lloyd

The most common fungus on aspen and black poplar was a *Libertella* sp., but its ability to cause decay has not yet been determined. *Armillaria mellea* was responsible for a large number of the butt infections, although it was not associated with extensive decay.

PROVINCE OF BRITISH COLUMBIA

FOREST INSECT SURVEY

G. T. Silver and R. A. Ross

Forest Biology Laboratory, Forest Zoology Unit, Victoria and Vernon, B.C.

INTRODUCTION

The black-headed budworm outbreak on northern Vancouver Island decreased greatly in extent and intensity. The one-year-cycle spruce budworm infestation in the Vancouver District continued to decline although the infested area increased in size. The two-year-cycle spruce budworm in the Babine Lake area caused heavy damage including bud injury. Aerial and ground surveys were made of the extensive damage caused in recent years by the Engelmann spruce beetle in the rather inaccessible mountainous areas of the Nelson Forest District.

The Victoria Laboratory received 2,058 insect collections and the Vernon sub-laboratory 2,592 for a combined total of 4,650. The 244 collections submitted by the British Columbia Forest Service and the 59 by other co-operators are gratefully acknowledged. The use of aircraft provided by the British Columbia Forest Service and forest industries was greatly appreciated.

Collections received during 1956 were distributed among the principal tree species as follows:

Coniferous trees	Collections		Broad-leaved trees	Collections	
Hemlock			Poplar—		
Western hemlock	976		Trembling aspen	204	
Mountain hemlock	3		Black cottonwood	82	
		979	Silver poplar	12	
Douglas fir		838	Lombardy poplar	3	
Spruce—			Miscellaneous poplars	9	
White spruce	330				310
Engelmann spruce	143				
Sitka spruce	75				
Black spruce	45				
Miscellaneous spruces	6				
		599			
Pine—			Alder—		
Lodgepole pine	308		Red alder	63	
Ponderosa pine	148		Green alder	27	
Western white pine	45		Mountain alder	8	
Whitebark pine	3		Sitka alder	7	
Shore pine	2		Miscellaneous alders	30	
Miscellaneous pines	4				135
		510			
Fir—					
Alpine fir	206				
Amabilis fir	38				
Grand fir	38				
		282	Willow		197
Western red cedar	78		Birch		106
		78	Western chokecherry		32
Larch—			Garry oak		18
Western larch	50		Hawthorn		14
Miscellaneous larch	4		Maple		12
		54			

Coniferous trees	Collections		Broad-leaved trees	Collections
Juniper—			Apple	12
Rocky mountain juniper	46		Arbutus	10
Common juniper	7		Cherry	9
Miscellaneous junipers	3		Miscellaneous broad-leaved trees	50
		56		
Yellow cedar	9		Total	905
		9		
Total		3,405		

Miscellaneous hosts or no hosts specified... 340

Grand Total..... 4,650

IMPORTANT INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)—The extent of the one-year-cycle spruce budworm infestation in the Lillooet River and Lake area changed little from 1956. The only new locality where spruce budworm larvae were collected in large numbers was near Pavilion Mountain, north of Lillooet. The size of the infestation, determined by ground and aerial surveys, was calculated at 498 square miles, an increase of 46 square miles over 1956. Of the total area, 78 square miles were classified as having suffered heavy defoliation, 33 square miles medium, and 387 square miles light. Defoliation in the Anderson and Nahatlatch River valleys was too light to map from the air.

Considering the outbreak as a whole, the trees continued to recover in 1957. Current defoliation along the upper Lillooet Lake and River was light, ranging from a trace to 10 per cent. The stands lost most of their 1953 to 1955 foliage, and the older needles are now dropping. Ocular estimates, checked by branch examination, showed that many trees have lost up to 65 per cent of their total foliage. Some tree tops and many branch tips have been killed. However, growth from adventitious buds was good and the trees should recover.

Defoliation of the current year's growth was heavy along the lower Lillooet River, ranging as high as 72 per cent in some plots—considerably higher than in 1956. Total defoliation also increased and some tops were completely stripped. Top killing occurred but no tree mortality was observed. Heavy defoliation and some top kill also occurred along Anderson and Seton lakes; damage to current growth was slightly less than in 1956, but averaged 60 per cent with some trees losing 100 per cent of their 1957 foliage. Stands in the Anderson River valley improved slightly.

The average number of egg masses decreased from 64 last year to 31 per 100 square feet of foliage surface in the plots along the Lillooet River and Lake. The highest egg counts in the entire outbreak were at the Skookumchuck plots where 128 egg masses were found per 100 square feet compared with 102 in 1956. The number of eggs along the Anderson and Seton lakes decreased an average of 70 per cent.

Development of the spruce budworm in the Pemberton area was much advanced over the past two years. The first sampling trip planned to collect partly developed larvae yielded only mature larvae and pupae. Twenty-nine per cent of the larvae and 35 per cent of the pupae were parasitized. About 9 per cent of the egg masses in the Lillooet River-Pemberton area contained one or more egg parasites compared with only slightly more than 4 per cent in the Anderson Lake-Fraser River area. Few virus-killed larvae were found in 1957. The outlook for 1958 is for reduced defoliation except in local areas where feeding will be heavy.

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The two-year-cycle spruce budworm infestation in the Prince Rupert Forest District continued severe in 1957. Ground surveys did not indicate an increase in the area but samples taken in the main outbreak at the head of Babine Lake showed that 99.9 per cent of the buds were attacked and about 80 per cent were killed or damaged. In July the white spruce-alpine fir stands developed a reddish appearance which was unusual because the budworm was in the first and light feeding year of its two-year cycle. Later surveys showed that white spruce trees had put out a good crop of foliage and were in a fairly satisfactory condition. Many alpine fir trees had not put on any new growth for two years, and in some cases there were no adventitious buds.

Barring unforeseen mortality, a heavy population of larvae can be expected in 1958. In mid-June, 1,675 larvae were counted on foliage bearing 2,139 buds. No population estimates were available after this date.

In general there was a further decrease in the population density of the two-year-cycle budworm in the Interior. Slight discoloration attributable to budworm feeding was observed only at Frost Lake and Lynx Creek in the Prince George Forest District. Collections: Coast 94, Interior 123.

Black-headed Budworm, *Acleris variana* (Fern.)—The black-headed budworm infestation on northern Vancouver Island decreased greatly in extent and intensity during 1957 and about 156 thousand acres of timber in the area were sprayed from the air during the year. All the of Island was surveyed by air in mid-August. The only defoliation observed was classed as light and covered approximately 80 square miles in 11 different localities. This was an enormous decrease in area compared with the 3,000 square miles of infestation in 1956.

The black-headed budworm population decreased greatly during the larval period. During the week of June 17, three-tree beating collections in the Nimpkish area averaged 70 larvae; similar collections from the same area during the week of July 15 averaged only one-third as many larvae. Similar decreases were noted in all areas sampled.

Larval parasitism was 62.4 per cent in the Port Hardy area and 45.3 per cent in the Campbell River area. The decrease in numbers of the budworm made pupal collections impossible. No disease of any importance was found in the field.

Damage to the principal host, western hemlock, was varied. Stands of reproduction near Port McNeill appeared healthy but half the trees examined had the leader killed. Similar light top-killing was prevalent throughout the Port Hardy area on pole-size timber. The heaviest damage to date is in the Nimpkish River area wher top-killing was common. Most tops have been killed back 2 to 3 feet and occasionally to 8 feet.

An egg survey was conducted during the first half of October, again with assistance from logging companies and the British Columbia Forest Service. A sample consisted of two 18-inch branch tips from the upper crown of each of three trees. The average egg count per branch for 170 samples was 0.36, a drop of 97 per cent from the average of 12 eggs per sample in 1956. This year there were 49 samples with no eggs compared with only one negative sample in 1956. Although there was not a complete collapse of the infestation, it did decrease to a small amount over the entire infestation area. No increases in population were noted in the central or southern portions of Vancouver Island.

Black-headed budworm larvae were common on the southern mainland section of the Vancouver Forest District in 1957. The highest count was at Seymour where three-tree beating samples yielded up to 86 larvae. Egg samples in this area indicate a light population for 1958. Larvae were also common in the Anderson and Nahatlatch River valleys.

Black-headed budworm larvae increased in distribution and numbers on Moresby Island, Queen Charlotte Islands, but the population was light. An aerial survey of the old infestation failed to reveal any tree mortality from the past outbreak, but scattered top-killing was noticeable. At South Bay, 16 out of 25 trees examined had dead tops. Some tree mortality is expected at Maud Island and South Bay.

Larvae were collected from many points in the Interior and the Yukon. Feeding by the black-headed budworm and sawflies, *Neodiprion* sp., caused slight discoloration of the foliage of decadent hemlock trees along Keen Creek and Wilson Lake in the central part of Nelson Forest District. Collections: Coast 456, Interior 240.

Douglas-fir Beetle, *Dendroctonus pseudotsugae* Hopk.—The number of attacked trees generally remained low in 1957. There was a slight increase in attack of standing trees in the Kamloops Forest District. Infestation intensity almost doubled in the western portion of the recently winter-damaged stands about Lac la Hache. For the first time in recent years this beetle was recorded in standing timber at the north end of the Arrow Lakes where about 100 trees were infested.

Groups of dead and dying Douglas-fir trees in Manning Park were heavily infested by this beetle. Few fresh attacks were reported on Vancouver Island. Near Comox freshly felled logs were attacked but no beetles were found in standing timber.

Mountain Pine Beetle, *Dendroctonus monticolae* Hopk.—The mountain pine beetle outbreak along the east shore of Babine Lake in the Prince Rupert District has decreased in area. No fresh attacks were observed, but it is not certain that the outbreak is declining.

Infestations persisted in stands of lodgepole pine along the western side of the Upper Columbia Valley from Frances Creek to Whitetail Lake, and in white pine along parts of the Big Bend Highway. The infestation in the lodgepole pine forest about Takla Lake has subsided.

Red Turpentine Beetle, *Dendroctonus valens* Lec.—In 1957, the red turpentine beetle severely infested 48 ten-inch d.b.h. ponderosa pine trees in the area immediately north of Little Shuswap Lake. Infested stems were all within a recently logged area; the large mature and over-mature ponderosa pine trees beyond the logged tract had not been attacked although a number of them had been killed in recent years either by *D. monticolae* or *D. brevicomis*.

Western Pine Beetle, *Dendroctonus brevicomis* Lec.—The western pine beetle population was low in 1957. A remnant population persists in ponderosa pine stands at Aspen Grove. A few small trees near Penticton, infested by *Nuculaspis*, were killed by this bark beetle.

Engelmann Spruce Beetle, *Dendroctonus engelmanni* Hopk.—Aerial and ground surveys in remote stands in the southern and eastern parts of the Nelson Forest District revealed that Engelmann spruce beetle infestations had caused more damage than was previously suspected; some infestations continued to be active in 1957. Almost all were at elevations between 5,000 and 6,000 feet.

Mature spruce stands covering 28 square miles in the valleys of Couldrey, Burnham, Cabin, Storm, and Bighorn creeks in the southeastern corner of the Province have been depleted by an estimated 45 million FBM in the last six years with the heaviest losses occurring before 1956.

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Losses totalling an estimated seven million FBM have been recorded in the valleys of Bloom, Warden, Blacktail, and Linklater creeks near the International Boundary. The attacks continued in 1957. An extension into Canada of a large infestation in the State of Washington has killed approximately one million FBM of mature spruce near the headwaters of Crutch Creek, southeast of Salmo.

A local but severe infestation has killed about 680,000 FBM in the valley of McPherson Creek near Fernie; other infestations not known before occurred along Wigwam River, between the headwaters of Malpass and Tree creeks, and bordering Beaver River and Quartz Creek west of Donald.

Western Hemlock Looper, *Lambdina fiscellaria lugubrosa* (Hulst.)—Larvae were found occasionally on southern Vancouver Island and in the Pemberton-Port Douglas area on the mainland. Small but larger than usual numbers of larvae were collected in the Seymour and Burwell Creek region, at points along the Fraser River Valley, in the Columbia River Valley, and at Port Coquitlam. The largest number of larvae from a three-tree beating sample was 23, from Stanley Park, Vancouver; the principal host was western hemlock. Hemlock loopers were collected infrequently over the rest of southern British Columbia; no outbreaks were observed. Collections: Coast 54, Interior 47.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—The infestation on trembling aspen trees at the north end of Adams Lake increased from 400 acres in 1956 to 700 acres in 1957. Defoliation ranged from 50 to 75 per cent in the newly infested areas and up to 100 per cent in the old portion. A second infestation in the Interior was discovered south of McBride; defoliation in varying degrees occurred over some nine square miles. Egg counts indicate that the forest tent caterpillar population density will decline although defoliation again may be severe in these two areas in 1958.

The forest tent caterpillar was found in association with the western tent caterpillar on the Saanich Peninsula, Vancouver Island. Hosts included willow, apple and rose. Although the population increased from 1956, it did not reach outbreak proportions. Collections: Coast 7, Interior 3.

Western Tent Caterpillar, *Malacosoma pluviale* (Dyar)—The outbreak on Saanich Peninsula, Vancouver Island, continued to decline in intensity. Parasitism was light but disease was prevalent, killing entire colonies in some areas. A continued decrease is expected.

Roadside trees and bushes at Langley Prairie were completely defoliated. Light to medium defoliation of orchards and roadside trees occurred in the Skeena River Valley from Exstew to Cedarvale and north to Kitsumgallum Lake. Scattered tents were observed along the lower Nass River.

Except for one or two small infestations, the western tent caterpillar population declined over much of the Interior. Collections: Coast 27, Interior 13.

Douglas-fir Needle Miner, *Contarinia* spp.—During 1957 there was a further decrease in numbers of the Douglas-fir needle miner in British Columbia; the heaviest infestation occurred in the Grand Forks area where damage ranged from a trace to 50 per cent of the needles on the current year's growth. Records of occurrence of these needle miners were obtained through much of the range of Douglas fir in the Interior.

These needle miners were common in most Douglas-fir stands on southern Vancouver Island. The attacks were light; only a few infested needles were found on most of the trees examined. Similar light attacks were observed in the Anderson and Nahatlatch River valleys on the southern mainland. Collections: Coast 42, Interior 122.

Phantom Hemlock Looper, *Nepytia phantasmaria* (Stkr.)—Several local but severe outbreaks occurred in 1957. Western hemlock and Douglas-fir at Queen's Park, New Westminster, and Central Park, Burnaby, were heavily infested. Both parks were sprayed with DDT in fuel oil on June 24. Central Park was sprayed again on July 8, using the same spray. Because of these operations, defoliation in both parks was light. Severe defoliation in 1956 caused heavy tree mortality in Queen's Park and the dead trees are being logged. Only two trees died in Central Park from the 1956 defoliation. Large numbers of the phantom hemlock looper were also found in a park area at Hope, but damage was not severe and no control measures were necessary.

A high proportion of larvae collected in all three park areas died during rearing. It is not certain if the high mortality resulted from a polyhedral virus prevalent in Queen's Park in 1956. Collections: Coast 39.

Conifer Sawflies, *Neodiprion* spp.—Several species of *Neodiprion* sawflies were numerous in 1957 but only one infestation requires comment. Approximately 20 acres of lodgepole pine reproduction and pole-sized trees in the Little Shuswap Indian Reserve were severely denuded. From 90 to 100 per cent of the old growth was defoliated, leaving only terminal tufts of needles. Another species of *Neodiprion* caused slight discoloration of Douglas-fir foliage in the same Reserve.

Western hemlock stands around Quatsino Sound, Vancouver Island, suffered light defoliation in 1957. Sawflies were also present in large numbers at Port Hardy and Denman Island, Blackwater Creek near Pemberton, and at several points along the mainland coast. Colonies were collected at Kitsumgallum Lake, Prince Rupert Forest District. Collections: Coast 372, Interior 380.

Pine Needle Scale, *Phenacaspis pinifoliae* (Fitch)—In 1957, scale damage to pine needles decreased in most of the ponderosa pine belts that have been affected during recent years in the Okanagan Valley, notably from Winfield to Oyama. The infestations near Naramata and Okanagan Falls persisted at moderate to heavy intensity. A severe infestation occurred in 2 square miles of ponderosa pine reproduction on the Nicola Indian Reserve.

Scattered light infestations of this scale were observed in lodgepole pine stands in parts of the Nelson Forest District, notably at a locality 5 miles north of Yahk.

Black Pine Needle Scale, *Nuculaspis californica* (Coleman)—The black pine needle scale again was abundant on ponderosa pine trees from Naramata to Penticton, and along the east side of Skaha Lake. A dense overwintering population persisted in the fall of 1957. Apparently this scale has proved more destructive than the white scale, *Phenacaspis*. About 4 acres of ponderosa pine trees in Botanie Creek Valley near Lytton were moderately infested with black scale.

Striped Alder Sawfly, *Hemichroa crocea* (Fourc.)—The infestation in the Vancouver Forest District decreased in extent in 1957. Heavy feeding occurred in the Coquitlam Valley where red alder trees were completely defoliated.

Light to heavy defoliation of red alder trees was observed along the Nass River between Grenville and Aiyansh in the Prince Rupert District. Up to 95 per cent defoliation occurred in scattered patches at Skidegate, Charlotte, Lawn Point, Alliford Bay, and Sandspit on the Queen Charlotte Islands.

The Kootenay Lake infestation subsided; only a 2-acre patch of birch and mountain alders at Sirdar was moderately infested. Collections: Coast 21.

Aspen Leaf Miner, *Phyllocnistis populiella* Cham.—In 1957 the aspen leaf miner again was abundant. The accompanying map shows the intensity of infestation determined by a standard sampling method.

Black cottonwoods at Kitseguecla Creek, Prince Rupert Forest District, was attacked heavily. No adults were obtained but the larvae were tentatively identified as *Phyllocnistis* sp. poss. *populiella*. Collections: Coast 15, Interior 54.

Silver-spotted Tiger Moth, *Halisidota argentata* Pack.—The silver-spotted tiger moth outbreak on Vancouver Island collapsed completely. Webs were observed early in the spring at Parksville and Campbell River, but no larvae were found after early May. Collections: Coast 3.

Yellow-lined Forest Looper, *Nyctobia limitaria* Wlk.—These loopers were common in collections on northern Vancouver Island. Up to 61 larvae were collected from three-tree beating samples. Collections: Coast 323, Interior 94.

Green-striped Forest Looper, *Melanolophia imitata* Wlk.—This looper was common in collections taken along the Fraser River Valley from Spuzzum Creek to Boston Bar. Three-tree beating samples yielded up to 48 larvae each in the Capilano Valley at the watershed gate, and up to 77 larvae for collections north of Stave Falls and Steelhead south of Stave Lake. Collections: Coast 260, Interior 80.

Sitka-spruce Weevil, *Pissodes sitchensis* Hopk.—A Sitka spruce plantation at Museum Creek, Vancouver Island, was heavily infested by this weevil. Attacks were confined mainly to trees under 20 feet in height. Small spruce trees in the Nitinat Valley were attacked in 1957.

Engelmann Spruce Weevil, *Pissodes engelmanni* Hopk.—In Howell Creek Valley, Nelson Forest District, about 35 per cent of the leaders of open-grown Engelmann spruce reproduction were killed by this weevil. South of McGillivray, 25 per cent of the trees on a sample strip of open-grown spruce were infested in 1956 and 1957.

A Pine Root Weevil, *Hylobius* sp.—Root weevils persisted in the white pine stands of the Nelson Forest District as far north as Boat Encampment where overmature trees were infested.

Poplar and Willow Borer, *Sternochetus lapathi* (L.)—This species has become a widespread pest of willows and some species of poplar in Nelson Forest District. A few alders were attacked near Brilliant and Edgewood.

The willows about Skookumchuck in Nelson Forest District are moderately infested by the poplar and willow borer. The infestation reported at Kimberley and TaTa Creek in 1955 has almost died out.

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.)—This defoliator was again numerous in some parts of the Prince George Forest District. Collections: Interior 16.

Satin Moth, *Stilpnotia salicis* (L.)—The satin moth population on trembling aspen near Currie Lake and at Lac Du Bois has decreased. This insect has spread throughout the Okanagan Valley where it seems certain to become a prominent pest of poplar shade trees.

Larvae were collected at Metchosin, Nanaimo, and along the Comox-Kye Bay road, Vancouver Island. Defoliation of Lombardy poplar, silver poplar, and aspen was light. Collections: Coast 6, Interior 16.

Fall Webworm, *Hyphantria cunea* (Drury)—Roadside clumps of chokecherry and other shrubs were completely denuded by the fall webworm in the more arid parts of the Kamloops Forest District. Collections: Coast 16, Interior 5.

Douglas-fir Tussock Moth, *Hemerocampa pseudotsugata* McD.—No tussock moth larvae were seen at Cascade or Olalla, where infestations occurred in 1955 and 1956. A few larvae were taken from Douglas-fir trees in the countryside about Lillooet. Collections: Interior 8.

Larch Sawfly, *Pristiphora erichsonii* (Htg.)—The larch sawfly continued to be scarce. Collections: Interior 1.

A Poplar Leaf Miner, *Phyllocnistis* sp.—A species of *Phyllocnistis* that does not leave a trail of frass in the mine (as *P. populiella* does) was numerous in black cottonwood, trembling aspen, and other poplars in parts of central and southern Interior British Columbia. On some sample trees as many as 88 per cent of the leaves were mined.

Aspen Blotch Miner, *Lithocolletis salicifoliella* Cham.—This leaf miner of ornamental poplars was much more numerous in 1957 than it has been in recent years. Several property owners, including tourist camp operators in the Okanagan Valley, requested information on blotch-miner control.

Willow Leaf Miner, *Lyonetia saliciella* Busck This miner was again abundant on willows in the Nelson Forest District. It was also numerous near Atlin in northwestern British Columbia. Birch trees, as well as willows, along the Big Bend Highway were severly infested. Collections: Interior 3.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.—The foliage of birch trees from Horsey Creek, along the Fraser River to Valemount south along Canoe River for at least 40 miles, was severly "browned" by *Bucculatrix* feeding. It was also severe in the Upper Lardo drainage about Trout Lake, Nelson Forest District.

Ambrosia Beetles, *Trypodendron lineatum* (Oliv.), and *Gnathotrichus retusus* (Lec.)—Douglas fir, western larch, lodgepole pine, and some cedar poles in the yards at Lumby were infested with these ambrosia beetles, but only a few decks of poles were attacked. The density of heaviest attack ranged from four to 46 holes with an average of 18 entrances per square foot at the butt ends of the poles. Another light infestation was observed in decked Douglas-fir peeler-logs at the north end of Slocan Lake. The average number of entrance holes in one sample log was about 35 per square foot.

Damage to softwood logs in the coastal region has been a common occurrence for many years. The chronic nature of this problem, added to the continuing difficulty in assessing yearly fluctuations in beetle populations, accounts for the lack of earlier reference to these insects. Both of these species can usually be found wherever logging occurs on the coast. but *Trypodendron* is much more common. Attacks are heaviest on logs, slash, and stumps in the forests, but logs in transit and in water storage are also infested. Occasionally, fresh sawn lumber in millyards is also attacked. The regional loss in degraded lumber exceeds an estimated $1 million a year.

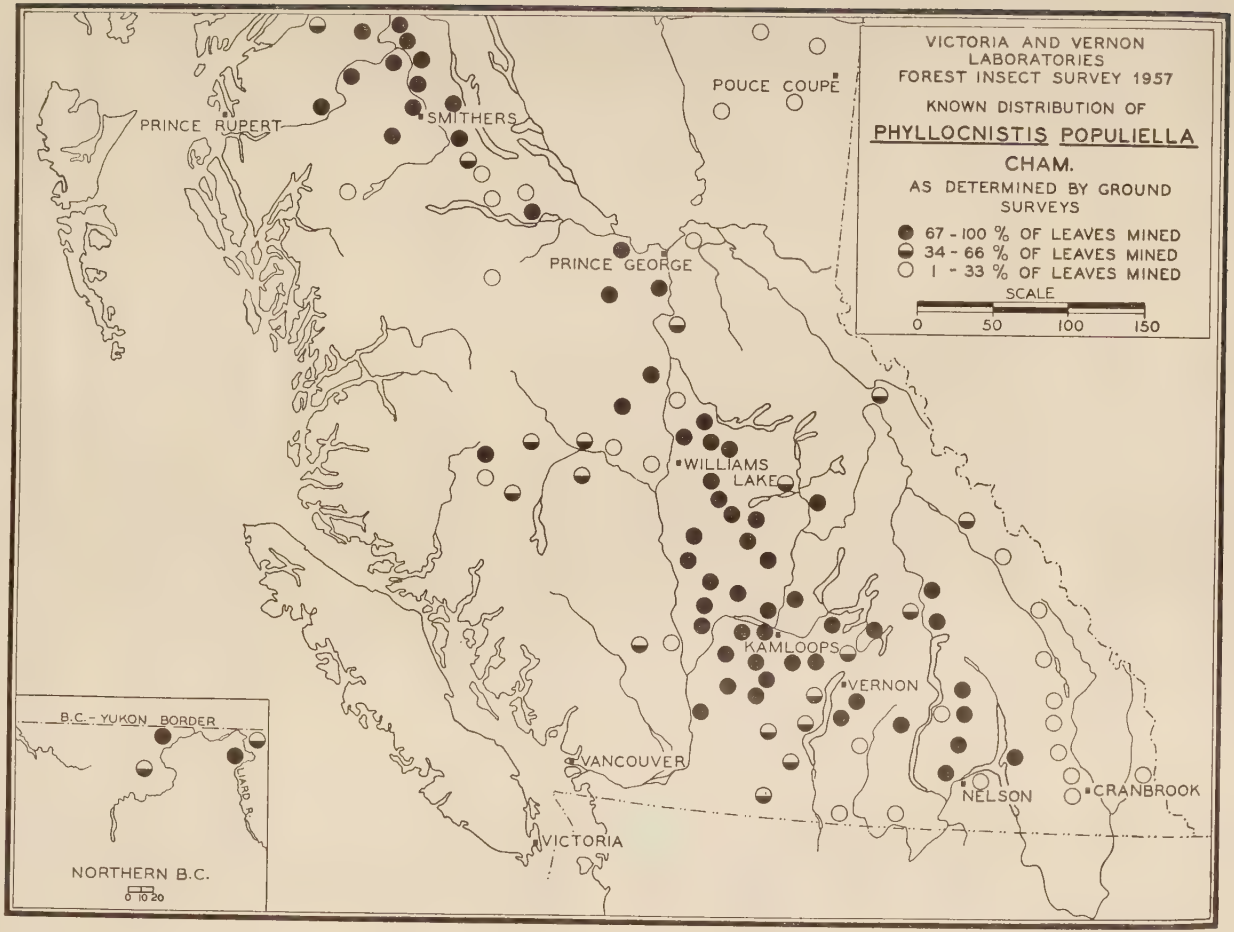
Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch)—The webs of this caterpillar were numerous on chokecherry trees along the south Thompson River Valley from Chase to Savona, and in eastern portions of the Nelson Forest District. Collections: Interior 8.

A Needle Feeding Beetle, *Dichelonyx* sp.—R. W. Reid of the Forest Biology Laboratory, Calgary, reported that during the spring of 1957, *Dichelonyx* adults were abundant in the Frances Creek area, Nelson Forest District. The foliage on the current year's growth of a number of reproduction Douglas-fir trees was almost completely stripped.

A Ponderosa Pine Cone Borer, *Dioryctria auranticella* (Grt.)—In 1957, the maturing ponderosa pine cone crop was light and cone insects were of greater significance than during heavy crop years. *Dioryctria auranticella* infested 45 to 70 per cent of the cones in the Osoyoos-Keremeos area; they attacked some 75 per cent of the second year cones at Savona, Kamloops Forest District.

Pine Tube Moth, *Argyrotaenia pinatubana* Kft.—Lodgepole pine trees along the highway, 4 to 8 miles south of Canal Flats, were infested by the pine tube moth. An average of four tubes of needles for each current year's terminal was recorded.

Flea Beetles, *Altica* spp.—A species of flea beetle caused browning of willow foliage by early July around the south end of Lower Arrow Lake. Another flea beetle severely skeletonized water birch trees in the eastern part of Nelson Forest District, notably in the vicinity of Fort Steele. Lakeshore cottonwood trees between Gray Creek and Boswell were discoloured by these beetles.


VICTORIA AND VERNON
LABORATORIES
FOREST INSECT SURVEY 1957
KNOWN DISTRIBUTION OF
PHYLLOCNISTIS POPULIELLA
CHAM.
AS DETERMINED BY GROUND
SURVEYS
67 - 100 % OF LEAVES MINED
34 - 66 % OF LEAVES MINED
1 - 33 % OF LEAVES MINED
SCALE
0 50 100 150
PRINCE RUPERT
SMITHERS
POUCE COUPE
PRINCE GEORGE
WILLIAMS LAKE
KAMLOOPS
VERNON
VANCOUVER
VICTORIA
NELSON
CRANBROOK
B.C. - YUKON BORDER
LIARD R.
NORTHERN B.C.
0 10 20

PROVINCE OF BRITISH COLUMBIA

FOREST DISEASE SURVEY

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INTRODUCTION

An intensive course in forest pathology given to the Forest Biology rangers in the spring of 1957 resulted in a marked increase in the quality of collections submitted during the field season. This observation is well supported by the list of "Other Noteworthy Diseases" presented at the end of this report. The fungi in this list now comprise new and important additions to the Victoria herbarium and in many cases represent diseases of present or potential economic importance. Many are causal agents of canker and dieback diseases which received particular attention in 1957.

There were no unusually severe disease outbreaks recorded in 1957. Foliage diseases, which are most subject to annual fluctuations, generally remained endemic. Although a few heavy infection centres were reported, they were confined to small areas. There were many reports of known damaging diseases such as the various mistletoes, Atropellis canker, and stem rusts. These added substantially to the distribution records of these important diseases. Reports of climatic injury were few and pertained to relatively light damage in all cases.

The Survey is again indebted to the Mycology Unit, Botany and Plant Pathology Division, for valuable help in identifying a large number of mycological specimens. Collections by co-operators continued to form a valuable part of the disease survey program.

During the 1957 field season a large number of fungi were isolated in culture particularly from dieback and canker diseases. A total of 2,715 collections were submitted to the Survey and are summarized by host as follows:

Coniferous trees	Collections	
Douglas fir		915
Fir—		
Alpine	323	
Amabilis	203	
Grand	25	
		551
Hemlock, western		287
Pine—		
Western white	125	
Ponderosa	85	
Lodgepole	29	
		239
Cedar—		
Port Orford	125	
Western red	15	
Yellow	3	
		143
Larch		
Western	21	
European	4	
		25
Juniper, Rocky Mountain		7
Yew, western		4
Total		2,422

Broad-leaved trees	Collections	
Alder	13	
Sitka	3	
		16
Aspen, trembling		15
Willow		13
Arbutus		9

Coniferous trees	Collections		Broad-leaved trees	Collections
Cypress—			Birch, western white	8
Monterey	126		Cottonwood, black	7
Arizona	5		Ash, mountain	3
		131	Cherry	3
Spruce			Maple, broadleaf	2
White	101		Cascara	1
Sitka	12		Chestnut, horse	1
Engelmann	6			
Black	1		Total	78
		120		

Miscellaneous or host not specified..... 215

Grand Total..... 2,715

IMPORTANT DISEASES

The Fungi Associated with Post-felling Deterioration of Douglas Fir and Yellow Pine—In 1956 a survey was carried out to determine the fungi associated with post-felling deterioration of Douglas fir and yellow pine in the Interior Region of British Columbia. Analyses were made in 21 localities of sample plots felled in 1953 by the Surveys Division of the British Columbia Forest Service. Cultural identification of the fungi involved have now been completed and the results are briefly summarized below.

Of the 20 fungi isolated from the two hosts, 17 occurred on Douglas fir and 12 on yellow pine. The fungi which occurred on 5 per cent or more of the trees sampled are presented by host in the following table.

Douglas fir (318 trees) Fungus	Percentage of trees infected	Yellow pine (180 trees) Fungus	Percentage of trees infected
Stereum sanguinolentum A. & S. ex Fr.	46.8	*Peniophora gigantea* (Fr.) Massee	37.8
Polyporus abietinus Dicks. ex Fr.	24.8	*Polyporus anceps*	31.7
Fomes pinicola (Sw.) Cke.	17.6	*Stereum sanguinolentum*	18.9
Polyporus anceps Peck	15.4	*Polyporus abietinus*	12.2
Stereum chailletii (Pers. ex Fr.) Fr.	14.8	*Peniphora phlebioides*	8.3
Lenzites saepiaria Wulf. ex Fr.	13.8	*Lenzites saepiaria*	6.1
Peniophora phlebioides Jacks. & Deard.	11.6		

A number of fungi were common to the two hosts as important agents of sapwood deterioration but their relative importance on the two trees was different. *Stereum chailletii* was common on Douglas fir but was not isolated from yellow pine. *Peniophora giantea*, which was the most common sap rot fungus on yellow pine, occurred only on 4 per cent of the fir sampled. The trees sampled were on the same plots with the percentage distribution of the two species varying somewhat in the different plots.

Inner Bark Stain and Cambial Necrosis Associated with Bark Beetle Gallaries in Alpine Fir—In a survey of bark beetle mortality in the McGillivray Lake region of the Kamloops Forest District only 35 per cent of recent mortality could be attributed directly to the activity of the bark beetle *Dryocoetes confusus* Sw. The remaining recently dead trees supported too few insects to account for their death. Furthermore the beetle attack in many such trees appeared incomplete. A tally of 1,821 alpine fir trees in five 1 x 40 chain strips showed 36.8 per

cent of the trees living, 59.0 per cent dead for more than two years, and the remaining 4.2 per cent recently dead. Of the latter group, beetle attacks accounted for less than half of the mortality. It was not possible to determine if the older dead trees had succumbed directly to beetle attack or if other agents were involved.

In order to account for the death of the lightly infested trees a more detailed examination was made to uncover other possible contributing agents. On shaving back the bark of lightly attacked recently dead trees, a light to dark-brown stain in the inner bark and underlying cambium was apparent. The staining was centered at beetle galleries and frequently coalesced with other similarly stained areas. Staining and actual lesion formation was more clearly evident in the cambium region where it was more restricted in extent and less confused with discoloration from normal drying of the bark. An examination of lightly attacked living trees revealed a similar but more distinctly defined staining and lesion formation in the cambium. In many cases staining had progressed to the point of girdling, indicating the imminent death of such trees. In all cases the staining was centred at beetle galleries.

Screening of a large number of cultures prepared from stained bark produced an unidentified fungus that was isolated from all stain samples and comprised 86 per cent of all isolates obtained. Identification and testing of this fungus are under way.

The problem is of particular interest because the beetle may serve as a vector for the fungus and even though the beetle attack may be unsuccessful, mortality can result from fungus infection which follows.

Pullularia pullulans Associated with Bud Necrosis in White Spruce —Mortality of a high percentage of white spruce buds in an area of severe spruce budworm, *Choristoneura fumiferana* (Clem.), defoliation in the Babine Lake area of the Prince Rupert Forest District added to the heavy stress on already badly weakened trees. Examination of a large sample of buds revealed a slight necrosis at the tips of a large proportion of the buds. *Pulluluria pullulans* (de Bary) Berkhout was isolated in agar culture from 95 per cent of the buds sampled. No other fungus was isolated. The 5 per cent which failed to yield *Pullularia* in culture was found to be free of necrosis. Further checks on bud development should be made in the spring and additional tests with the fungus are warranted.

Diseases of Non-indigenous Trees—An extension of a survey of exotic plantations, introduced as a regular function of disease survey in British Columbia in 1956, has raised the number of exotic plantations examined to 65 and increased the number of tree hosts under observation to 40. Establishment of sampling points and preparation of ecological descriptions for all plantation sites were completed during the year.

Examinations in 1957 confirmed earlier observations that competition from brush, animal browsing, and climatic injury comprise the most apparent hazards in the early life of plantations. As reported in 1956, only one plantation to date has reached a stage where disease fungi and insects have become an important factor in its development.

Two fungi recorded in the 1956 report are worth particular attention. *Tympanis laricis* (Fuckel) Sacc. was found associated with fusiform cankers of European larch on Vancouver Island. Damage up to the present has been light. This fungus, known in Europe and North America on native larches, has not been recorded previously as a parasitic fungus. A related species, *Tympanis confusa* Nyl., was found to cause severe cankering in red pine plantations out of the host's normal range in eastern United States.

A gall forming blister rust, *Peridermium* sp., probably the aecial stage of *Cronartium coleosporioides* Arth., caused branch and stem galls on Scots pines but litte damage resulted in four plantations on Vancouver Island and the mainland. Should Scots pine offer no more resistance to this rust than native lodgepole pine during its later development, the disease might become a problem on introduced pines.

Disease Conditions in Forest Nurseries—Post-emergence losses were light in all forest nurseries except the Duncan Nursery where they were moderately high largely because of damping off and root rot. Experiments with some promising fungicides are still under way to try to reduce losses from pre-emergence damping-off which has partly accounted for inadequate emergence at all nurseries.

OTHER NOTEWORTHY DISEASES

(V.I.—Vancouver Island; Q.C.I.—Queen Charlotte Islands)

Host	Organism	Locality	Remarks
Alder, red.....	*Belonidium parksii* Cash	Ucluelet, V.I.	On decorticated stems. First host record on alder and first record of occurrence beyond California.
	Nectria pithoides Ellis & Everh.	Lake Cowichan, V.I.	On bark of recently killed, young tree. First herbarium record.
	Poria purpurea (Fr.) Cke.	Langford, V.I.	Associated with a white rot of alder. First herbarium host record.
Alder, Sitka.....	*Hypoxylon fuscum* (Pers.) Fr.	Giscome	Associated with dieback. First herbarium host record.
	H. morsei Berk. & Curt.	Giscome	Associated with dieback. First herbarium host record of fungus.
	Rosellinia lignaria (Grev.) Sacc.	Giscome	Associated with dieback. First herbarium record of fungus.
	Tympanis alnea (Pers.) Fr. var. *hysterioides* Rehm.	Saxon Lake	Associated with dieback. Probably first host record. See J. W. Groves, in Can. Jour. Bot. 30: 612-614. 1952.
Alder.....	*Anthostoma microsporum* Karst. var. *exudans* Peck	Prince George	On dead stems. First herbarium record.
(Alder *cont'd*)...	*Valsaria moroides* (Cke. & Peck) Sacc.	Prince George	Associated with dieback. First herbarium record of genus.
Apple, Pacific crab...	*Gymnosporangium cornutum* Arth. ex Kern	Massett, Q.C.I.	Found near common juniper (*Juniperus communis*), the alternate host for this rust fungus. First record of the fungus occurring on apple (*Malus*).
Aspen, trembling	*Encoelia fascicularis* Kasrt.	Cache Creek	On dead bark. First herbarium record of the fungus.
	Tympanis spermatiospora (Nyl.) Nyl.	Merritt	On dead bark. First herbarium record of the fungus.
Chestnut, horse.	*Nectria cinnabarina* (Tode) Fr.	Victoria, V.I.	Associated with canker and dieback of mature ornamentals. First herbarium record.
Conifers.....	*Poria vaillantii* (DC.) Fr.	Victoria, V.I.	On lumber under moisture barrier of crawl space in house. First herbarium record.
Cottonwood, black.....	*Cucurbitaria staphula* Dearn.	Quesnel	Associated with fusiform galls on living twigs. First herbarium record.
	Linospora tetraspora Thompson	Vancouver	Caused severe defoliation. First herbarium record of the pathogen.
	Poria pannocinta (Rom.) Lowe	Quesnel	Caused a white rot. First herbarium record.

[1] Complete lists of fungi collected in British Columbia and deposited at the herbarium in Victoria (DAVFP) are available from the Forest Biology Laboratory, Victoria, B.C.

OTHER NOTEWORTHY DISEASES (Continued)

Host	Organism	Locality	Remarks
Cypress, Monterey.....	*Phomopsis* sp.	Victoria, V.I.	On frost-damaged branches of an ornamental. First herbarium host record and possible cause of dieback.
Elm.....	*Daedalea unicolor* Bull. ex. Fr.	Agassiz	Capable of causing white rot and cankers of living trees. First herbarium host record.
Fir, alpine.....	*Retinocyclus abietis* (Crouan) Grove & Wells	Prince George	Associated with canker and dieback of leader of living, immature tree. First herbarium record.
	Rhizosphaera pini (Cda.) Maubl.	Smithers	On dead needles. First herbarium record.
	Scoleconectria balsamea (Cke. & Peck) Seav.	Prince George	On dead bark of mature tree. First herbarium record.
Fir, Douglas....	*Lophium mytilinum* (Pers.) Fr.	Lake Cowichan, V.I.	Associated with *Dasyscyphus* sp. on wound cankers of 40-year old Douglas fir. First herbarium record.
	Retinocyclus abietis (Crouan) Groves & Wells	Southbank	Associated with canker on living Douglas fir. First herbarium host record.
Fir, grand.....	*Fomes officinalis* (Vill. ex Fr.) Faull	Royal Oak, V.I.	Fruiting on trunk of old dead and down tree. First herbarium host record.
Fir, white.....	*Pucciniastrum epilobii* Otth.	Englewood, V.I.	Causing needle rust of seedlings in exotic plantation. First host record from B.C. Found to be locally epiphytotic on alpine fir in 1955 (Ann. Rept. For. Ins. Dis. Surv., p. 105, 1955).
Hemlock, western.....	*Cryptosporiopsis* sp.	Sooke, V.I.	Associated with hemlock dieback. "Looks like the conidial state of *Pezicula livida* (B. & Br.) Rehm" J. W. Groves. Cultured. First herbarium record.
	Sporoschisma sp.	Courtenay, V.I.	Associated with stem canker. "This may be a new species" J. W. Groves. First herbarium record.
	Valsa abietis Fr.	Courtenay, V.I.	On dead branches of living tree. First herbarium host record.
Holly, English...	*Trochila ilicis* (Chev.) Rehm	Victoria, V.I.	On shed leaves. "No previous N. American reports have been found". 36th Ann. Rept. Can. Pl. Dis. Surv. 1956, p. 119 (1957).
	Ceuthospora phacidioides Grev.	Victoria, V.I.	On shed leaves. First herbarium record.
Larch, European.	*Tympanis laricina* (Fuckel) Sacc.	Mesachie, V.I.	Found in exotic tree plantation, associated with stem canker. First herbarium host record.
Larch, western...	*Tympanis laricina* (Fuckel) Sacc.	Makinson Flats	Associated with fusiform branch canker. First herbarium record.
Maple, broadleaf.	*Melanconiopsis inquinans* Ellis and Everh.	Victoria, V.I.	Associated with *Tubercularia vulgaris* Tode, and stem-and-branch cankers of an ornamental tree. First herbarium record.
Maple, broadleaf.....	*Nectria cinnabarina* (Tode) Fr.	Saanich, V.I.	Associated with branch cankers, First herbarium host record.
Oak, Garry.....	*Corticium leucoxanthum* Bres.	Victoria, V.I.	Associated with white rot of branches. First herbarium record.
Pine, ponderosa.	*Atropellis piniphila* (Weir) Lohm. and Cash	Echo Lake, V.I.	Associated with cankers and flagging in ponderosa pine plantation. New herbarium host record.
Pine, Scots.....	*Peridermium* sp.	Prince George	Galls on leader and branches of ornamental at Dominion Expt. Sta. Inoculated a possible alternative host (*Castilleja* sp.) with negative results. Probably one of the gall rusts (*Cronartium* spp.) native to B.C. The infected tree has been destroyed. See also Ann. Rept. For. Dis. Surv. 1956, p. 91.

OTHER NOTEWORTHY DISEASES (Concluded)

Host	Organism	Locality	Remarks
Poplar, Lombardy....	*Stereum purpureum* (Pers. ex Fr.) Fr.	Victoria, V.I.	On living tree. First herbarium host record.
Spruce, Engelmann...	*Retinocyclus abietis* (Crouan) Groves and Wells	Lumby	Associated with branch and stem cankers of living, immature trees. First herbarium host record.
Spruce, white...	*Fomes annosus* (Fr.) Cke.	Burns Lake	Causing root rot. First herbarium host resord.
Spruce, white...	*Nectria cucurbitula* Sacc.	Prince George Crescent Spur	On stems of dead and down trees. First herbarium record.
	Retinocyclus abietis (Crouan) Groves and Wells	Quesnel	Associated with fusiform twig cankers. First herbarium host record.
Spruce, Sitka....	*Meliola pinicola* Dearn.	Skidegate, Port Clements, Q.C.I.	A "sooty mold disease" on living needles of lower branches. First herbarium record.
Willow.....	*Cryptomyces maximus* (Fr.) Rehm	Manson Creek	Associated with stem and branch cankers of living, mature trees. First herbarium record.
	Fomes igniarius (L. ex Fr.) Kickx	Lake Cowichan, Campbell River, V.I.	Causing white heart rot of mature trees. First herbarium host record.
	Melanomma pulvis-pyrius (Pers.) Fuckel	Campbell River, V.I.	On stem of decorticated willow. First herbarium host record.
	Nectria coccinea (Pers.) Fr.	Lake Cowichan, V.I.	On recently killed shoot and associated with *Malanomma pulvis-pyrius*. First herbarium host record.
Yew, western....	*Sphaerulina taxicola* (Peck) Berl.	Kaslo	Associated with needle blight. First herbarium record.

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